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THE UNIVERSITY OF ALBERTA

BIOFEEDBACK TRAINING AND AUTONOMIC RESPONSIVITY IN A CRIMINAL POPULATION

by

MARNIE FINSTAD

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1986

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ABSTRACT

Criminality has been an ongoing problem for all nations, and is viewed as a major social issue in modern industrialized society. The majority of crimes are committed by a relatively small percentage of individuals who demonstrate persistent criminal behavior. For more than two centuries, psychiatrists, and sociologists have studied these crime-prone personalities, labelled variously as psychopathic, sociopathic, or more recently as exhibiting an antisocial personality disorder. Over time, the focus of research on persistent criminality has moved from an original emphasis on biology to in-depth analyses of the sociology of criminality. In recent years, the consideration of physiological involvement has re-emerged.

The following study was conducted within a maximum security Federal Institution with criminal subjects classified as dangerously violent or persistently criminal, to measure the effects of a biofeedback assisted relaxation training program on control of muscle tension, and to examine certain physiological correlates of sociopathy. Thirty six subjects were included in the study, with 18 experimental subjects and 18 control subjects. Biofeedback was provided through the use of an electromyograph. Intrapsychic change was measured on a pencil and paper questionnaire, administered in pre- and post-treatment

conditions. Subjects were administered a pre- and post-treatment psychophysiological stress profile where EMG levels were measured in conditions of relaxation, stress, and recovery. No feedback was provided for the stress profile. Treatment consisted of six weekly training sessions of approximately a half-hour duration, where subjects received audio and visual feedback from the electromyograph. Preliminary analysis of the data demonstrated no training effect. When eight subjects who demonstrated extreme and unpredictable muscle spasms were eliminated from the experiment, a significant treatment effect was demonstrated. Analysis of the training data demonstrated that the learning effect became significant on the fifth and sixth training sessions. Skin conductance levels were simultaneously measured to determine if a correlation existed between central nervous system response as measured by EMG levels, and autonomic nervous system response as measured by EDR levels, within the conditions of the experiment. No correlation between EMG and EDR activity was found.

The thirty six subjects were grouped on a scale measuring the frequency of antisocial behaviors. These groupings were examined to determine if differences in EMG or EDR responsivity, as measured in experimental conditions, correlated with the behaviorally distinguished groups. Among the physiological variables examined,

significance was demonstrated in one respect. The most antisocial group, as behaviorally defined, demonstrated an ability to recover from stress, when recovery was measured as a greater than 50% recovery to pre-stress levels, determined by skin conductance levels in Mmhos. Other groups recovered from stress with expected frequencies. Antisocial groups also distinguished with respect to environmental trauma in childhood, and with respect to the frequency and type of crime committed. Subjects were also grouped on the basis of scores on the Socialization scale of the California Personality Inventory. While these groups related to the groups based on antisocial criteria, no significant behavioral or physiological differences were demonstrated when subjects were separated on this basis.

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Table of Contents

Chapter		Page
I.	INTRODUCTION	1
	Purposes of Study	1
	Chapter Outline	4
II.	SURVEY OF THE LITERATURE	6
	Criminality	6
	The Persistent Criminal or Sociopath	9
	Environmental Correlates of Antisocial Personality	14
	Physiological Correlates of Antisocial Personality	22
	The autonomic nervous system	34
	Autonomic correlates of antisocial personality (ASP)	37
	Biofeedback Training	39
	Research Questions	44
III.	METHOD	47
	Subjects	47
	Apparatus and Facilities	49
	Research Design	51
	Procedures	53
	General procedures	53
	Stress profile procedures	54
	Treatment procedures	55

Instruments.....57
The California Personality Inventory.....57
The Socialization Scale.....58
The State Trait Anxiety Inventory.....61
IV. RESULTS.....65
Experiment One.....65
Question one.....65
Question two.....70
Question three.....73
Experiment Two.....75
Question one.....75
Question two.....77
Experiment Three.....77
Question one.....77
Question two.....81
Question three.....81
Question four.....83
V. DISCUSSION.....85
Experiment One.....85
Experiment Two.....90
Experiment Three.....91
REFERENCES.....107
APPENDIX A.....113
APPENDIX B.....120
APPENDIX C.....124
APPENDIX D.....126
APPENDIX E.....134

APPENDIX F.....139
APPENDIX G.....142
APPENDIX H.....145
APPENDIX I.....148
APPENDIX J.....150

LIST OF TABLES

TABLE		PAGE
1	Mean and Median EMG Levels in Conditions of Relaxation, Stress, and Recovery in Pre (P1) and Post (P2) Treatment Periods for Experimental (G1) and Control (G2) Groups (N=18,N=18)	67
2	Mean and Median EMG Levels in Conditions of Relaxation, Stress, and Recovery in Pre(P1) and Post(P2) Treatment Periods for Experimental (G1) and Control (G2) Groups (N=13,N=15)	69
3	Mean and Median EMG Levels of Experimental (G1) and Control (G2) Subjects in each of the Six Treatment (Tr) Periods for Experimental (G1) and Control (G2) Groups (N=13,N=15)	72
4	Standard Scores and Group Means on the A-State of the STAI, Form X-1, in Pre (P1) and Post (P2) Treatment Periods (N=35)	74
5	Mean and Median EDR Levels in Conditions of Relaxation, Stress and Recovery in Pre (P1) and Post (P2) Treatment Periods for Experimental (G1) and Control (G2) Groups (N=13,N=15)	76
6	Mean and Median EDR Levels in Experimental (G1) and Control (G2) Subjects in each of the Six Treatment (Tr) Periods (N=13,N=15)	78
7	Categories of Antisocial Behaviors Used to Distinguish Subjects on a Behavioral Basis	80
8	Physiological Differences as Measured in the Experiment within Subject Groups Distinguished on the Basis of Behavioral Criteria	82
9	Physiological Differences as Measured in the Experiment Within Subject Groups Distinguished by the Socialization Scale of the California Personality Inventory	84

CHAPTER ONE

INTRODUCTION

Purposes of Study

The purposes of this study have been threefold. A primary goal has been to assess the effects and rate of learning of a biofeedback assisted relaxation program on a sample group of serious criminal offenders. The effects of the training program were measured as a function of physiological and emotional indicators of change. Physiological change was determined through changes in skeleto-muscular tension as measured by electromyography on pre- and post- tests. Electrodermal responsivity was simultaneously measured. Emotional change was measured on The State Trait Anxiety Inventory, Form X-1, developed by Spielberger, Gorsuch, and Lushene, (1968). Biofeedback training was given over a six week period with one training session per week. An examination of the extent and rate of learning achieved in this program provides information as to what may constitute an efficient relaxation training process for inmate subjects. Administrative staff at the Edmonton Institution, where the study was conducted, supported the program and expressed interest as to the findings therein. Their interest was based on the

practical goal of control with respect to acts of violence within the prison and measurement of the costs of a relaxation training program in terms of such gain. The inmates themselves demonstrated an interest in a process which was specifically provided to help them reduce the subjective anxiety and tension which they habitually and painfully experience in the tense environment of the penitentiary. The biofeedback program was seen as an alternative or an adjunct to the use of drugs which are commonly consumed as a means to combat the stresses inherent in prison life.

A second, but also primary purpose ~~of~~ the study was to determine if a relationship exists between certain physiological characteristics, measured as previously described, and criminal behavior. A body of research exists to suggest that some patterns of criminality may be correlated with a physiological or neurological dysfunction. This neurological dysfunction seems to be related to impulsive behavior, poor conditionability, and abnormal autonomic arousal processes. If such physiological differences do, in fact, exist the early identification of such factors along with developmental and sociological indicators may assist educators and other professionals in the provision of special attention for the child or adolescent who is <u>at risk</u> with respect to the development of persistent criminality. Further

experimentation may determine if a biofeedback-assisted relaxation training program can modify an individual's arousal patterns and the tendency toward impulsive, aggressive behavior. To determine if a correlation between persistent criminality and autonomic arousal patterns does exist, subject groups which were separated on psychological factors were examined for differences in electrodermal responsivity, which is a physiological mechanism under the control of the autonomic nervous system. Psychological differences were identified in two ways, through the examination of behavioral criteria which constitute persistent criminality, and through the use of the Socialization (So) scale of the California Personality Inventory (CPI).

Finally, throughout the study, by interview, observation, the collection of personal historical data, and examination of the experimental data, the researcher has sought to gain an understanding of those factors or combination of factors which impinge upon the individual or act through the individual to produce the persistent or violent antisocial behavior which results in the personal tragedy of serious crime both from the perspective of the victim of such crime, and the perpetrator who may endure a lifetime in prison.

Chapter Outline

Chapter One serves as an introduction to the study. Included is a statement of the basic purposes of the study and a chapter outline which serves to delineate the general process of the study.

Chapter Two reviews theory and research related to the development of persistent criminality as relevant to the purposes of the present study. In this respect, sociological, psychological, and psychophysiological perspectives are examined. Historically, criminality was judged to be a physiological defect. As sociological studies and theories developed, the emphasis moved to the influence of environmental factors, both psychological and sociological. Only in recent years, has a small but substantial body of research emerged to reassert physiological factors. The chapter reviews this process and concludes with the specific questions addressed in this study.

Chapter Three deals with the methodology of the current research project, and includes a description of the subjects, apparatus and facilities, research design, procedures, and instruments.

Chapter Four presents the results of the experiment. Included is a presentation of the data, the methods of analysis, and the results of the analysis as applied to the questions under study which require statistical interpretation.

Chapter Five begins with a brief overview followed by a discussion related directly to each of the research questions. The chapter concludes with a discussion of the practical and theoretical implications of the present study. Further considerations with respect to prevention and treatment of persistent criminality are discussed as such considerations have arisen through the conduct of this study.

CHAPTER TWO

SURVEY OF THE LITERATURE

Criminality

In a work which focuses on a so-called criminal population we may properly ask the question What is crime? and Who is a criminal? Crime may be defined as any act for which a court may lawfully impose punishment (Glaser, 1978) or alternately, as defined by law, a crime is an intentional violation of the criminal law committed without defense or excuse and penalized by the state (Tappan, 1947). This definition excludes certain other violations of human rights, such as war, racism, sexism, or poverty. Further to the above definition, which may be philosophically debatable, crime is distinguished in certain jurisdictions as referring to offenses punishable by confinement or death, while those calling only for fines are labelled as infractions or violations.

Criminal law makes a further major distinction in the conceptualization of crime, in separating victimizing crimes such as murder or theft, from so-called victimless crimes such as prostitution or drug abuse, where no one

person considers themselves to be deprived or injured. This conceptualization may provoke argument as those involved may be perceived by others as, in fact, being victimized by their own activities, however voluntary their involvement may be (Schur & Bedau, 1974). This issue has been handled in a semantic sense by using the terms predatory and non-predatory, with predation implying a preying on others. Predations can be sub-divided into crimes against persons or as crimes against property, or as wilful predations as compared to criminal negligence (Glaser, 1978). Predatory crimes include assault, murder, rape, theft, fraud, and robbery. Predations are separated into wilful predations or criminal negligence, according to whether the offender intended to harm another party or merely failed to take precautions against accidentally inflicting injury. Non-predatory crimes include illegal performance offenses, such as public drunkenness, illegal selling, and also consumption offenses such as narcotics sales, prostitution, disloyalty or treason, or illegal status offenses as may be applied to juveniles. Non-predatory crimes may be classified as to whether they are criminal only when they have a complaining audience or whether they are criminal because of what is sold, purchased, used, or possessed (Glaser, 1978).

Canadian criminal law classifies those criminal offenses which may warrant a jail term on an offense severity scale (Corrections Canada, Policy and Procedures Manual, 1982). On this scale, offenses are labelled as minor, moderate, serious, or major (Appendix A). In Canada, individuals who have been sentenced to a prison term of two years or more are assigned to the Federal penitentiary system. Those individuals who are given a prison sentence of less than two years are assigned to a provincial jail. The penitentiary system is further differentiated into minimum, medium, or maximum institutions. Within this system, Corrections Canada assigns the sentenced individual a security classification on a scale from one(1) to seven(7) with an S7 falling into the category of greatest risk. As an example, the Edmonton Institution in Edmonton, Alberta, is one of eight maximum security institutions in the country where S6 individuals are incarcerated.

The S6 classification is based on benchmark criteria which assign an inmate as;

(a) a high escape risk; or
(b) as a hostage taker; or

(c) as aggressive and dangerously violent; or

(d) as one who has received the conviction of a major offence; or

(e) as one who has received a prison term of ten years or over; or

(f) as one has been sentenced to a period of preventive detention under the Criminal Code of Canada.

Benchmark criteria for the remaining security classifications are similarly based, with reference to the seriousness of the offense, the individual's past criminal record, and an examination of current behavior (Appendix A).

The Persistent Criminal or "Sociopath"

An inmate population in a Federal penitentiary will comprise a group which will range from those who have committed a single criminally defined offense to those individuals who have had involvement with the courts on an ongoing basis since childhood or pre-adolescence. While the more occasional offender may be considered as an individual who demonstrates a periodic emotional or situationally induced stress reaction, the persistent criminal or recidivist has been consistently viewed over time to be somehow abnormal, or the victim of some sort of

moral character defect. This type of individual has been studied from behavioral, physiological, and environmental perspectives for nearly two centuries, and has been labelled variously as being psychopathic, sociopathic, or more recently, as one who demonstrates an Antisocial Personality (ASP). The disorder was first identified by Pinel who ascribed the label emportement moniaque sans delier in 1801 to a man of wealthy and aristocratic heritage who became involved in the judicial system. This man was perceived to be lacking in conscience and to be given to savage and seemingly unprovoked aggressiveness, and eventually killed his own wife (Rotenberg & Diamond, 1971). The term psychopath was applied by Benjamin Rush, an American psychiatrist and a contemporary of Pinel, to this personality type which seemed to combine an apparent moral deficit with good intelligence (Smith, 1978).

While Pinel saw the moral deficit as environmentally influenced, and Rush viewed the moral faculty to be congenital, the concept of moral insanity generally prevailed in Western culture with reference to the psychopath for over a century. In 1888, in Germany, Koch introduced the term psychopathic inferiority and attributed the condition to physiological causes, specifically, a hereditarily determined weakness. Koch's definition, along with the growing acceptance of Darwin's theories of biological determinism, led to an acceptance of

the incorrigibility of deviance and the futility of social-moral treatment (Smith, 1978). In the 1920 s, Freudian psychoanalytic theory saw the psychopath not as constitutionally inferior, but as psychodynamically inferior, a product of pathological family dynamics, where most particularly the mother was seen as the source of emotional inadequacy, failing to inculcate genuine empathic humanness in her child (Freud, 1940).

As long ago as 1930, the English psychiatrist, G.E.Partridge, advocated the term sociopath as a replacement for psychopath. This change seemed to emphasize that the sufferer was socially deviant rather than internally perverse (Preu, P.W., 1944, in J.V.McHunt, 1944).

Harvey Cleckley is perhaps the recognized expert in English literature on the psychopath, through his successive editions of The Mask of Sanity. Originally published in 1941, Cleckley lists sixteen criteria to describe the psychopath, criteria which include both behavioral symptoms such as superficial charm, unreliability, untruthfulness, poor judgement, failure to learn by experience, poverty in emotional affect and impersonal sex life, as well as a description of certain intrapsychic etiological events which were seen to include an absence of delusions, an absence of nervousness,

pathologic egocentricity, and an incapacity for love (Cleckley, 1976).

Cleckley's criteria has been considered to be comprehensive and has resulted in widespread acceptance of his definition of the psychopath as a personality type. Cleckley's definition emphasized the potential psychopathology of the condition, as well as demonstrating that the psychopath is not only be be found in a criminal population, but may just as well be found in a psychiatric hospital, or may be seen as an individual functioning in his environment, a businessman, lawyer, or physician.

In recent years, the terms psychopathy and sociopathy have come into disuse, as a more behaviorally oriented conceptualization of the disorder has been formulated. Following a behavioral perspective, the Diagnostic and Statistical Manual, Third Edition, (DSM III), published by the American Psychiatric Association in 1980, classifies the psychopathic or sociopathic personality under the classification of Personality Disorder, specifically, as an Antisocial Personality Disorder (ASP). The DSM-III presents a succinct, inclusive description of the disorder. The essential features of this definition specifies a history of continuous and chronic antisocial behavior in which the rights of others are violated, with persistence into adult

life of a pattern of antisocial behavior that began before the age of fifteen, with a failure to sustain good job performance over a period of several years. This description excludes the conditions of severe mental retardation, schizophrenia, or manic episodes, and summarizes the condition :

> "lying, stealing, fighting, truancy, and resisting authority are typical early childhood signs. In adolescence, unusually early or aggressive sexual behavior, excessive drinking, and use of illicit drugs are frequent. In adulthood, these kinds of behavior continue, with the addition of inability to sustain consistent work performance or to function as a responsible parent and failure to accept social norms with respect to lawful behavior. After age 30 the more flagrant aspects may diminish, particularly sexual promiscuity, fighting, criminality,and vagrancy." (DSM-III, 1980).

Associated features frequently seen in ASP are complaints of personal distress, tension, depression, an inability to tolerate boredom, and the often correct conviction that others are hostile towards them. There is

often a markedly impaired capacity to sustain lasting, close, warm, and responsible relationships with family, friends, or sexual partners. The disorder is often very incapacitating, commonly resulting in years of penal institutionalization. Illiteracy and Substance Use Disorders are frequent complications. Predisposing factors are Attention Deficit Disorder in childhood and Conduct Disorder in adolescence. Other predisposing factors are sociological and include extreme poverty, and early childhood removal from the home. This disorder is seen to be more common in males than in females, and is particularly common in the fathers of both females and males with the disorder. Both genetic and environmental factors are seen to be important in the genesis of the disorder (DSM-III).

Environmental Correlates of Antisocial Personality (ASP)

The role of the family in producing criminal behavior has been examined by a number of scholars. Social learning theorists present the theory that for the sociopath, other persons somehow have not taken on appropriate reinforcement value during the childhood developmental years, so that these persons are not able to be controlled by the relationship between themselves and others (Ullmann & Krasner, 1969). These theorists believe that something in

the sociopaths' social training is missing, so that the basic steps to full socialization have not been traversed. The social learning theorists interpret psychoanalytic theory in a behavioral sense. In learning theory, the sociopathic behavior develops in imitation of the cold, distant qualities of an emotionally remote parent. The child models this powerful but uninvolved parent and this translates to his or her lack of learning of the formal requirements of social interaction. Another aspect of the theory involves reinforcement inconsistency, where the parents unintentionally reward only superficial conformity while underhanded nonconformity actually occurs. In this situation, the child learns or strives to avoid blame and punishment rather than to actually differentiate right from wrong. Such a child may lie to avoid punishment or make a superficial response such as "I'm sorry and I won't do it again." In this case, the child is considered to be rewarded for escaping punishment without feeling guilt (Ullman & Krasner, 1969). These authors say that the young psychopath frequently finds himself in situations where his behavior is considered as if it were inconsequential, and because of this reaction the developing child has difficulty learning about himself because there is a lack of corrective feedback.

Gerald Patterson, another social learning theorist, in his study of problem children at the Oregon Social Learning Centre, concluded that parental ineffectiveness is a primary factor in the development of their childrens' misbehavior. Patterson said that irritable inconsistent parents tend to produce aggressive children, and that indifferent and ineffective parents produce larcenous children (Patterson, 1982).

Maher's theory of psychopathy is similar. Maher describes a situation where a psychopath may have a parent who forestalls or reduces punishment for an act when the child "promises to be good." In this case, the child learns to pretend penitence and to escape the fear of punishment. Such a child may be frequently cute and come to associate parental love with his charm or his attractive appearance. "A child who has been protected from distress will have no basis for interpreting it in others when he sees it" (Maher, 1966, p.217).

Gough (1948) has formulated an alternate theory of psychopathy, a theory which views the psychopath as pathologically deficient in role-playing skills. Gough deems this role playing to be essential in making one

sensitive in advance to the reaction of others. The psychopath is seen not to be able to identify with others, and to be unable to judge his own behavior from another's point of view. The psychopath, then, cannot grant the justice of punishment and is in fact most apt to be dismayed by it, as described by Cleckley. The psychopath is therefore seen, primarily, to suffer a failure of empathy. He cannot fit into the shoes of another.

Glueck and Glueck (1950) conducted a ten year longitudinal study of delinquent boys in Boston. Their conclusions were that delinquency seems to be the result of an interaction between certain constitutional factors and a home environment where one or both parents are indifferent or hostile to the child, with lax or erratic disciplinary practices. McCord and McCord (1959) published data from another long term study which involved 650 boys in a program designed to prevent delinquency. The McCords' conclusions included the finding that delinquent boys are about twice as likely to come from quarrelsome families with lax discipline.

Other scholars have looked at the process of attachment between parents and children. Daniel Freedman (1975) studied twenty pairs of newborn twins of the same sex. Identical twins were significantly more similar in behavior than fraternal twins, and the inference is made

that temperamental differences are at least partly constitutional. These differences may not always be genetic but may result from prenatal or perinatal experiences. Certain babies may exhibit characteristics which are difficult and discourage warm parental attachment. John Bowlby (1969) stressed the harm that maternal deprivation or lack of attachment between mother and child can create, including such reactions as depression and delinquency. Rutter (1978) suggests that a lack of attachment can lead to affectionless psychopathy which he describes as a personality characterized by a lack of guilt, an inability to keep rules and an inability to form lasting relationships. Attachment or non-attachment may influence the process of socialization, whereby the child develops the desire to conform to social conventions, to please an important other and develop conscience, the conditioning process where outside reinforcers are internalized.

Stressful and discordant families seem to affect boys more than girls. Rutter and Giller (1984) review relevant studies and conclude that parental hostility and quarrelsomeness tend to be associated with conduct disorders among sons to a greater extent than among daughters. Wilson and Herrnstein (1985) survey the literature with reference to the effect of broken and abusive families and conclude that the evidence with

respect to broken homes is inconsistent, although the data seems to suggest that family structure is less important than family interaction and individual temperament. The evidence with respect to abusive families, while incomplete, suggest that child abuse and poverty tend to occur together and that abuse and neglect have a significant impact on child behavior. Impulsive and violent parents may transmit a pattern of family discord, violence, and disorganization to their offspring. Seemingly, abused children will not easily form a strong parental attachment, nor receive consistent discipline, nor reinforcement for desired behavior.

With respect to the relationship between schooling and crime, studies seem to consistently demonstrate that serious delinquents show signs of delinquency at a young age, demonstrate low achievement levels, misbehave, and drop out of school early. Misbehaviors include skipping classes, hitting teachers, or damaging school property (Gottfredson, 1981). Personality attributes which may lead to such difficulties may include low intelligence, especially the verbal component of intelligence, as successful performance in school is highly dependent on the application of verbal skills. Those children who perform poorly seem more likely than others to drop out or strive to find their place in an alternate mode. Other personality characteristics which may negatively affect

school performance are the traits of impulsivity and aggression. Such children tend to find school confining and boring. Further, those children who have not been conditioned to learn the connection between actions and consequences through inconsistent discipline, who are without an attachment to a respected adult figure, may resent any adult authority, and may be troublesome, in and out of school (Wilson & Herrnstein, 1985). The school may or may not exacerbate the tendencies of the child at risk, through teacher labelling, inappropriate curriculum or through exposure to deviant sub-cultures. Rutter (1978) who studied aggression and delinquency in adolescence, found that only those schools which provide order in an environment of warmth, with an ethos which respects achievement can reduce delinquency among their students.

With reference to the effect of the community at large, recent research minimizes the influence of peers or gangs on individual criminality. Hirschi (1980), who conducted a cross-sectional study of thousands of delinquent boys in California, concluded that chronic deliquent boys became delinquent long before acquiring adolescent peers, as a result of cognitive and personality traits that reflect constitutional predisposition, family socialization, and early school experiences. Boys weakly attached to parents and unattached to the rules of conformity will associate with peers of a similar outlook,

but will tend not to form very strong loyalties with anyone. This conclusion excludes the strongly organized large inner-city gangs which may exert a marked influence on criminal behavior.

Other sociological theories of delinquency have been presented. Lemert (1967) advanced a theory of deviance called labelling theory, a process whereby the labelling of a person as delinquent or criminal causes others to react to them in a manner which fosters further law-violating behavior, by limiting opportunities in legitimate pursuits and making the individual think of himself as criminal. Cloward and Ohlin (1960) applied strain theory to delinquency asserting that economically disadvantaged adolescents turn to crime to achieve goods unavailable to those with limited education or affluence. Crime is known to occur at a higher rate in cities, where anonymity may act to loosen the controls against antisocial acts, and where more and greater opportunities for crime exist (Wilson & Herrnstein, 1985).

With respect to the use of drugs, alcohol has a statistical correlation with crime. In studies which examine alcohol use and murder, in at least one third of the cases alcohol has been involved (Greenberg, 1981). Of prison inmates interviewed in California, one quarter said they had got drunk and hurt someone at least once

(Peterson, and Braiker, 1980). Bohman, Cloninger, Sigvardsson, and von Knorring (1982) examined the heritability of alcoholism and criminality in 862 adopted Swedish men. Bohman et al, found that the sons whose biological parents had a criminal record were four times as likely to have a serious criminal record as were the sons of biological parents who had no convictions of crime. At the same time, the sons of biological parents who had a record of alcohol abuse were more likely to be alcohol abusers. There seemed to be little overlap between the two groups, but for those subjects who were criminal and abusers of alcohol, the crimes committed were more frequent and were more serious. With reference to other forms of drugs, the effects of heroin, cocaine, and the so-named soft drugs, are considered to make the user less aggressive or violent, and although such drug use may be connected with crime, the crime may be related to illegal procurement and trafficing, and non-violent rather than violent predatory offences (Chambers, Dean & Pletcher, 1981).

Physiological Correlates of Antisocial Personality (ASP)

The sociological correlates of antisocial behavior have been well researched and are their significance is generally recognized. Alternately, psychiatrists have explained antisocial deviance in psychodynamic terms. One of the most influential psychiatric theories of delinquency

hypothesized that delinquent children were acting out their parents unconscious antisocial wishes (Johnson & Szurek, 1952). This kind of theory led to the belief that an effective treatment for delinquents would be psychotherapy, with the belief that self-awareness would be the path to self-control. This faith in the psychodynamic etiology of maladaptation developed despite Freud's own assertions that some day all the behaviors he had described psychodynamically would be explained in terms of biology and chemistry (Freud, 1940).

These primarily psychosocial ways of understanding and treating antisocial behaviors may have arisen as a reaction to the biologic or genetic theories that preceded them. Particularly, the psychodynamic response may be seen as a direct response to the old theories of Lombroso who considered criminality to be a manifestation of immutably inherited biologic inferiority (Gould, 1981).

In the 1950's, the discovery of medications such as the antipsychotics and antidepressants that modified psychotic conditions which had been previously resistant to psychotherapy alone, reintroduced an emphasis on neurobiologic factors. The difference at this time is that immutable neurobiologic inferiority is not implied as in Lombroso s time, and the possibility of treatment and

improved functioning is recognized (Lewis,1983).

The attention to biologic factors does not deny the role of social status or environmental influence in contributing to juvenile and adult antisocial behavior. At the same time, low social status and negative environmental influence is not a necessary condition for the development of chronic, widespread antisocial behavior, as all children who grow up in such conditions do not become criminal (Robins, 1966). In recent years, studies which examine the neuropsychiatric aspects of juvenile and adult violence have been conducted.

Antisocial behavior in the parent of subjects with ASP, specifically the father, has been shown to be an important predictor of similar behavior in children, and although having an antisocial father may be associated with lower class status, the father's psychiatric status, and hence the implication of genetic factors are seen to be important determinants (Robins, 1966).

The condition of <u>hyperactivity</u> seems to be a childhood precursor of adult sociopathy. The condition is characterized by excessive movement, distractibility, impulsivity, and general academic and behavioral troubles. Hyperactive children are at an elevated risk for criminality and alcoholism (Satterfield, 1978).

The sociopath demonstrates, according to Cleckley, "poor judgment and an inability to learn from experience." This difficulty in learning seems to be independent of a lack of general intelligence. Hare and Quinn (1971) found inmate subjects classified as sociopathic to fail to become conditioned to stress as measured by skin conductance. The skin conductance response is presumably attached to emotion, in this case an anticipation of a punishment in the form of a shock.

Autonomic conditioning may be correlated with enthusiasm for tasks which require verbal approval and success in school (Ax, Lloyd, Gorman, Lootens, & Robinson, 1978). Social motivators depend on a sensitivity to blame or disapproval. A sociopath may not work for social approval because such approval will not affect his emotionality. Without such conditioning, the sociopath may lack the ability to learn by experience, or to follow society's conventions (Wilson & Herrnstein, 1985). Eysenck (1977) considered the failure of social training in the sociopath to be a function of poor innate conditionability.

The sociopath is commonly seen to demonstrate impulsivity. As such, future events will be discounted more than with other persons, especially if the distant event is aversive. Impulsivity may be related to poor

conditionability and verbal intelligence, as language is the medium which connects an act with it's delayed consequences. Children who tend not to verbalize their behavior also tend to demonstrate uncontrolled aggressiveness and impulsive outbursts (Meichenbaum, 1975). Impulsivity is seen as an important correlate to delinquency. Children who were impulsive in their performance of simple psychomotor tasks later dropped out of school or became delinquent, as reported by Kelly and Veldman (1964).

Persistent criminality has been shown to be highly familial in both white and black families (Cloniger, Reich & Guze, 1975). Sociopathy in men and women clusters in the same families but is much more frequent in men than in women and is more prevalent among relatives of sociopathic men. The sex difference in prevalence appears to be due to sex related cultural or biological factors with a higher threshold for females. Those females who do become sociopathic are seen to demonstrate greater deviancy in their behavior than do men. There is no difference in prevalence and transmission according to race. Cloninger et al. (1975) theorize that the pattern of transmission may be the function of a polygenic genetic component where the genetic effect is small relative to environmental factors.

Another factor in the etiology of persistent delinquency which is indirectly associated with genetic and environmental influences is demonstrated in the work of Lewis, Shanck, and Balla (1979), who found seriously delinquent children had sustained significantly more severe head and face injury with differences significant by age two years. Perinatal difficulties and psychiatric impairment were significantly more prevalent in the histories of incarcerated delinquents, especially in those who are more violent. These authors suggest that a combination of early central nervous system trauma, parental psychopathology, and social deprivation is responsible for serious violent delinquency.

Evidence to support the influence of neuropsychological differences between violent and non-violent adolescents is given by Spellacy (1977) who administered a neuropsychological assessment battery as well as the Minnisota Multiphasic Personality Inventory (MMPI) to 40 violent and 40 non-violent adolescent males. In this study, multivariate analysis showed significant differences between groups on neuropsychological tests, but not on the MMPI. The results are consistent with the hypothesis that genetic impairment contributes to the impulsivity and associated violent behavior seen in some delinquent adolescents.

What is the nature of this neuropsychological impairment? A summary and evaluation of the status of biomedical research on brain and aggressive behavior is given by Goldstein (1974). Goldstein's summary indicates a lack of unanimity in the full interpretation of the data with respect to the morphophysiological mechanisms underlying abnormal violent behavior. Some significant agreements do emerge:

(a) that behavioral abnormalities have physiological substrates that involve predominantly structures connected to the rhombencephalon or hindbrain;

(b) that portions of the central nervous system in this area appear to contain neural mechanisms and biochemical substrates which are concerned with goal-directed behavior and the motivational components of this behavior;

(c) that the limbic lobe and in particular, the amygdala, and the limbic system are seen to be central in the neural mechanism that governs behavior and emotion;

(d) reciprocal relations between the neocortex and limbic systems are seen to be involved in emotion and behavior although the nature of these interactions is uncertain.

More specifically, neurochemical studies have associated violent behavior with changes in neurotransmitter metabolism. Neurotransmitters are chemical substances released into the synaptic space between the nerve endings and mediate the impulse of one neuron to the next, in periods of neural activity. These neurotransmitters include the substances norephinephrine (NE), acetylcholine (ACh), dopamine (DA) and serotonin(Se) (Goldstein, 1974). This central nervous system activity influences behavior, not directly, but through the autonomic nervous system.

Linder, Goldman, Dinitz, and Allen (1970) describe an experiment in which certain groups of sociopaths demonstrated a cardiac lability to epinephrine. These authors suggest that this effect may be due to a single autonomic defect, reflecting diminished function of catecholamine secreting neurons, including those involved with sensory input.

On the basis of that information which has been accepted, a number of theories are hypothesized to account for the sociopaths' observed characteristics of impulsivity, hyperactivity, and his failure to learn to inhibit punished responses. Hare (1970) postulates the possible presence of sub-cortical lesions, or the existence of abnormally low levels of autonomic and cortical arousal. Hare suggests that the persistent criminal may engage in stimulus-seeking behavior as compensation for his chronic low arousal level. A theory of diminished reactivity and/or adaptation to sensory inputs of all types whereby the sociopath experiences a diminished ability to learn adaptive behavior is presented by Quay (1965). Hare and Quinn (1971) present a similar theory which looks more specifically at the inability of the persistent criminal to learn avoidance behavior. In their study psychopathic subjects failed to demonstrate autonomic conditionability as measured by electrodermal responsivity. This lack of conditionability may be associated with a low fear arousal, and hence poor avoidance learning.

Woodman and Hinton (1978) report a study in which the rates and ratios of excretion of adrenaline and noradrenaline were compared in maximum security patients (social deviants), military mental hospital patients and normals. Urine samples were taken in routine and stressed

situations. The relative rate of adrenaline and noradrenaline excretion under daily routine was similar in the three groups studied. However, during periods of anticipation of unfamiliar stressful situations approximately a quarter of the socially deviant group exhibited an atypical increase in amount of noradrenaline and a decrease in adrenaline. This resulted in a catecholamine balance that differed strikingly from other subjects. The deviant subjects with abnormally high noradrenaline/adrenaline ratios also exhibited low physiological anxiety responsivity to stressors and had a history of convictions for extreme physical violence. These findings suggest that an unusual biochemical and physiological stress anticipation response is found in a group of patients with aggressive psychopathic behavior.

Of the above mentioned theories, one theory which is seen to relate clinical and experimental observations with respect to antisocial or sociopathic behavior has been Hare's (1968) suggestion that the sociopath has a pathologically low level of autonomic and cortical arousal, that he is hyporeactive compared with the normal individual, and consequently exists in a state of stimulus hunger. According to this theory, since the criminal subject is underreactive to stimuli which would be exciting or frightening to normal persons, he requires a greater

variety and intensity of sensory inputs to increase his arousal level to the optimum.

Although evidence exists to support Hare's theory (Hare, 1965, 1968, 1970; Hare & Quinn, 1971), Mawson and Mawson (1975) theorize that the sociopath demonstrates a greater magnitude and faster rate of change in arousal level and reactivity than normal individuals. Mawson and Mawson see the reactivity of the sociopath as being low when arousal is low, and high when arousal is high. This conclusion fits clinical descriptions of the criminal subject as being overreactive to stress and prone to act violently in situations that fail to provoke violence in normal individuals. In neurological terms, persistent criminality may be viewed as a biochemical disturbance manifested in abnormal oscillations in neurotransmitter functioning, autonomic activity, and behavior. Specifically, the sympathetic-parasympathetic system is viewed as a dual system characterized by rhythmic fluctuations in the relative dominance of two groups of neurotransmitters, one group being the noradrenergic and dopamine systems, the other group being the acetylcholine and serotonin systems. The noradrenergic and dopamine systems are responsible for increments in behavioral activiation and accompanying increases in sympathetic nervous system arousal. The acetylcholine and serotonin systems are responsible for behavioral

inhibition, sleep, and parasympathetic activation. Mawson and Mawson (1977) suggest that switches in the rate of change of dominance from one group of transmitters of one system to the other may be faster in sociopaths and that, secondly, the magnitude of the oscillations in the peak levels of activation and inhibition may be greater in the sociopaths.

Variance in arousal and mood level is also considered to be associated with differential functioning and balance between the hemispheres. Flor-Henry (1978) has presented neurological evidence to link dominant hemispheric dysfunction to sociopathy. Further to Flor-Henry's work, Tucker (1981) indicates the importance of specific and apparently lateralized arousal systems in the brain that support the differential cognitive capacities of the two cerebral hemispheres. Evidence in support of this laterality of function has been found where the dopaminergic arousal processes, which mediate the left hemisphere have been altered in experiments with animals. In these experiments, avoidance learning and behavior which involves sequential organization has been affected (Iverson, 1977).

These experiments suggest that impairment or lesions of the left hemisphere seem to impair an individual's capacity for balanced evaluation of the problems of daily

living. Hall, Hall, and Lavoie (1968) suggest that the left hemisphere normally performs the role of a censor in controlling and inhibiting what may be the more loosely structured ideation of the right side of the brain. Such lack of inhibition is seen to be descriptive of what we observe in the operationally defined antisocial personality syndrome.

In summary, a considerable amount of experimental evidence is presented to implicate a neurophysiological dysfunction in sociopathic behavior. This neurophysiological dysfunction is seen to be related to arousal mechanisms and cortical dysfunction, specifically in the left hemisphere. Hare (1978) presents evidence that the neurophysiological correlates of persistent criminality are limited to a pure or primary group of such subjects.

The autonomic nervous system

The human nervous system can be divided into a central and a peripheral system. Included in the central system are the brain, the brain stem, and the spinal cord. A part of the brain which is pertinent to our interests is the hypothalamus. The hypothalamus is located in the brain,

below the cerebral cortex, and acts as a coordinating mechanism between the brain and the endocrine or glandular system (Selye, 1976). The hypothalamus responds to the stressor message from the brain, through the limbic system, and initiates the arousal process. The arousal process is mediated, then by the glandular system to the autonomic nervous system.

The peripheral nervous system innervates the periphery of the body and includes the voluntary sensory motor system and the autonomic nervous system. The autonomic nervous system is also known as the visceral or involuntary nervous system. It has parts in both the periphery and the central systems. This system maintains internal homeostasis and regulates metabolic processes such as heart rate, blood pressure, digestion, temperature maintenance and also controls the tonicity of the smooth muscles of the blood vessels. In controlling these functions, the autonomic system is chiefly regulated by the hypothalamus. Thus, the hypothalamus is the body's important regulating center in maintaining visceral homeostasis and initiating the stress response or what has been known as the fight-or-flight reaction (Jencks, 1977).

Within the autonomic nervous system are two mutually inhibiting systems, the sympathetic and the parasympathetic nervous system. These two systems innervate nearly every

organ in the body. The action of the sympathetic system increases the expenditure of energy, and the parasympathetic system reduces, calms, and conserves energy. The sympathetic system acts in a general way, adjusting metabolic processes to a changing environment, to external stresses or to internal anxiety states. In acute stress, these adjustments include secretion of the hormones, adrenaline and noradrenaline, acceleration of the heart rate, increased blood pressure, diversion of blood from the skin to the trunk and the skeletal musculature, all of which constitute, in Selye's (1976) words, initiation of the General Adaptation Syndrome.

Conversely, the parasympathetic system promotes those metabolic activities which restore and maintain energy resources, including digestive processes, relaxation, blood vessel dilatation, slowed heart rate, secretory and excretory processes (Jencks, 1977).

In summary, the autonomic nervous system serves the internal organs of the body, through two mutually opposing systems, the sympathetic and the parasympathetic, whose functions are integrated to maintain internal equilibrium. Control centers for this system are primarily in the hypothalamus, although specific reactions are mediated at lower levels in the central nervous system, without involving the brain.

Autonomic correlates of antisocial personality (ASP)

With reference to the theories which correlate arousal mechanisms and sociopathy, some investigators have monitored autonomic activity of persistent antisocial subjects and these studies have included the monitoring of electrodermal reactivity (Gruzelier & Venables, 1975; Hare, 1978). Results have not been consistent although differences have been relatively consistent in the direction of lower tonic or resting skin conductance (SC) levels for the sociopathic subjects (Hare, 1978). The SC levels of sociopaths have been seen to decline at a faster rate and to a greater extent than those of normals during the course of boring, repetitive, experimental conditions (Hare & Quinn, 1971). Sociopathic subjects in these situations are observed to become notably drowsy.

With respect to tonic SC, interestingly enough, Hare has found that inmates with high ratings of sociopathy, as based on behavioral criteria, and low scores on the So scale from the CPI, had lower levels of tonic SC than did those inmates who had high ratings of sociopathy and high So scores. These findings give support to the idea that the So scale may distinguish between sociopathic groups (Hare, 1978).

With respect to electrodermal arousal in excitatory situations, some investigators have reported no differences between antisocial subjects and control subjects in SC levels (Lippert & Senter, 1966). Others have found not a fixed, lower, or higher level of arousal, but evidence of greater magnitude and faster rates of changes in arousal level in sociopathic subjects (Mawson & Mawson, 1977). Higher but not significantly higher heart rates have been found in aggressive criminal subjects under excitatory conditions (Hare, 1968). Subjects diagnosed as sociopathic have demonstrated an increase in SC levels in a simulated stressful situation where arithmetic problems were presented (Hare, 1968). Mawson and Mawson (1977) cite Schachter and Latane to have found sociopaths to show significantly larger increments in pulse rate following an injection of adrenaline than non-sociopathic subjects. Blackburn (1976) found the more aggressive members of inmate groups to show higher EEG reactivity in a cold pressor test.

In summary, persistent criminal subjects are seen to demonstrate differences in arousal level which may be most consistent with theories that the sociopath exhibits an altered range of variability in autonomic reactivity as compared to pro-social individuals. These arousal levels may be measurable through changes in electrodermal skin

response. Specifically, these differences may be evidenced through:

(a) lower levels of skin conductance in the tonic or resting state;
(b) lower levels of arousal in stress anticipation;
(c) higher levels of arousal when certain types of excitatory stimuli are presented; and
d) differences in recovery rate following the presentation of stress provoking stimuli.

The failure of the persistent criminal to learn socially conditioned behavior patterns has been related to this difference in autonomic arousal. The So scale of the CPI has been shown to further distinguish sub-groups of sociopathic subjects who may demonstrate such differences in physiological reactivity.

Biofeedback Training

Biofeedback is used to train individuals to influence and control physiological processes, whether autonomic or musculoskeletal, which result, at least in part, from

psychosomatic or stress-related factors. By receiving appropriate moment-by-moment information regarding these processes, the individual develops an awareness of sensory pathways and proprioceptive mechanisms associated with their function. This can lead to voluntary control over these functions through a conscious manipulation of somatic processes. Thus, with appropriate feedback, the involuntary effect of stress on one or more physiological processes may be reversed.

In biofeedback training, an electrical monitoring system detects and amplifies these internal physiological processes, which normally are undetected. Observation of the characteristics of the display enable the individual to attain increased voluntary control over the physiological function being displayed. General decreased arousal of the central and sympathetic nervous systems is the main goal of biofeedback assisted relaxation training. Decreased arousal may be evidenced through lowered levels of muscle tension, skin conductance, respiration rate, heart rate, and peripheral vasodilation.

Biofeedback may be applied through a variety of different types of biofeedback instruments (electromyograph, electroencephalograph, dermograph, etc.). Because of the highly interactive nature of physiological processes which are influenced by

psychosomatic-psychological factors, more than one form of biofeedback may be useful in influencing the course of a specific disorder.

The current applications for biofeedback instrumentation are extensive, and include the psychosomatic/psychological components of such disorders as tension and migraine headaches, hypertension, Raynaud's Disease, bruxism, alcoholism, chronic anxiety, obsessive behaviour, facial tics, and torticollis. Biofeedback is also employed in a variety of muscle rehabilitation applications as a rehabilitative learning tool.

Muscle relaxation (EMG) biofeedback is the most widely used technique to reduce muscle tension throughout the body and to reduce general levels of arousal. Reduced muscle tension is believed to promote a shift from sympathetic to parasympathetic dominance in the autonomic nervous system (Budyznski, 1973). The relationship between skeletal musculature functioning and the autonomic nervous system has been elaborated on by Gellhorn and Kiely (1972). These authors suggest that reduced muscular tension is one means by which the dominance of NA and DA systems responsible for sympathetic arousal may be reduced.

Feedback dermography is the process of monitoring the electrical properties of the skin conductance signal. Skin conductance level is a function of sweat gland activity, which in turn is considered to be a function of sympathetic arousal in the autonomic nervous system. Martin and Venables (1966) hypothesize the sweat glands to be the primary determinants of skin conductance, and the cholingeric activity of the sympathetic system stimulating the sweat glands to be the primary physiological control agent.

While conductance levels can be utilized to assess relative arousal levels over a a series of sessions, and the change in skin conductance level from beginning to end of the training session may be used as a basis of comparing learning progress from session to session, actual baseline levels are subject to significant variation according to room temperature, general environment, emotional state, time of day, and even season of the year. Therefore, the concept of electrodermal activity as a direct monolithic index of emotional arousal is not considered to be warranted. At the same time, individual differences are demonstrated. A subject may display a relatively high conductance level with little responsivity, which may correlate with a profile of high chronic arousal, yet with minimized emotional lability. A relatively low conductance

level and high responsivity may indicate a generally relaxed but emotionally labile pattern.

The biofeedback system may also be used with clients who require assistance with impulse control, with an emphasis on gaining conscious control over certain autonomic processes. The goal is to achieve voluntary relaxation in the presence of stressful stimuli, to become sensitive to mood and changes in mood, and to gain in control over such change. Sex offenders, drug and alcohol offenders, and explosive temper offenders include subjects who may benefit from such training.

It can be theorized that through training in the control of skeletal muscle tension levels, that autonomic reactivity may be simultaneously reduced. Cortical inhibition may be learned through biofeedback training to modify the more primitive fight-or-flight response which is seen in criminal behavior where such conditioning has not previously occurred (Eysenck, 1970). This theorization leads to the speculation that learned control in autonomic reactivity may exert some influence on the instability of mood and the violence-prone activity of the persistently criminal subject.

Research Questions

The present investigation was conducted to answer the following questions:

Experiment One

1. Do criminal subjects demonstrate significant learning in relaxation skills through the effects of an EMG assisted relaxation training program as measured by pre- and post-training stress profile EMG levels?

2. Do criminal subjects demonstrate significant learning in relaxation skills through the effects of an EMG assisted relaxation training program as measured by performance over treatment sessions?

3. Do criminal subjects demonstrate significant learning in relaxation skills through the effects of an EMG assisted relaxation training program as measured by pre- and post-levels of subjective anxiety on The State Trait Anxiety Inventory?

Experiment Two

1. Does learned control of muscular tension correlate with changes in autonomic responsivity as measured by examination of pre- and post- EDR stress profile change?

2. Does learned control of muscular tension correlate with changes in autonomic responsivity as measured by examination of EDR levels in the six training sessions?

Experiment Three

1. Do inmate subjects who are grouped on the basis of behavioral criteria distinguish with respect to autonomic responsivity as measured by EDR stress increments?

2. Do inmate subjects who are grouped on the basis of behavioral criteria distinguish with respect to autonomic responsivity as measured by EDR stress recovery?

3. Do inmate subjects who are grouped on the basis of the So scale of the CPI distinguish with respect to autonomic responsiity as measured by EDR stress increments?

4. Do inmate subjects who are grouped on the basis of the So scale of the CPI distinguish with respect to autonomic responsivity as measured by EDR stress recovery?

CHAPTER THREE

METHOD

Subjects

The experiment included male subjects who were inmates in the Edmonton Institution, an S6 classified Maximum Security Penitentiary. The S6 classification means that each inmate subject has been considered to be aggressive and dangerously violent, or riotous, or a high escape risk, or to have been involved in a hostage taking incident. The inmate may or may not have committed a major offense (Corrections Canada, Policy and Procedures Manual, 1982). Major offenses include murder, attempted murder, kidnapping, hostage taking, espionage or violent terrorist activities (Appendix A). The Edmonton Institution is one of eight Maximum Security Penitentiaries in Canada. In this country, only two institutions, known as Special Handling Units, house criminals of a higher security classification.

Of the subjects under study, 24 were sentenced for violent predations against persons, 11 subjects were sentenced for violent predations for material gain, and one subject was involved in non-violent illegal commerce.

Subjects ranged in age from 20 to 56 years, with a mean age of 31.8 years. Only eight subjects were below the age of 25 years. The qualifications to enter a S6 institution are stringent and few subjects can meet these qualifications at a young age.

Approval for the research project was obtained from Corrections Canada, Regional Headquarters, Saskatoon, through the assistance of the Assistant Warden, Socialization, Edmonton Institution. The researcher had previously been employed at the penitentiary for a six month period on a contract basis, and had provided a biofeedback training program during this time. The program had been well received by the inmate population and one of the original participants was contacted by the researcher and requested to inform the inmate population that a biofeedback training program would again be offered to interested inmates. It was anticipated that as the program progressed and became more widely known that inmates would continue to volunteer. This was indeed the case, and a waiting list of approximately twenty volunteers was available at all times. The original goal of the study was to train a total of 40 inmates, 20 of whom would serve as a control group, by random selection. The agreement between the researcher and the Institution entailed that all interested subjects be trained within the time available. At the end of the study, 36 inmates had been fully

trained. It was anticipated at the beginning of the program that approximately 20 per cent of the volunteer subjects who started in the program, would not complete the training by reason of transfer or unforeseen prison incident. This figure proved to be a serious underestimate. What might have been considered to be a captive clientele proved to be an elusive clientele. Although 36 subjects did complete the training program, an additional 26 subjects, or 42 per cent of the total who began training, did not complete the program. Of these 26 subjects, 14 were transferred to other institutions, nine dropped out, one subject was murdered, and one subject committed suicide. One inmate received training but did not agree to participate in the research. A total of 62 inmates were then seen for at least one interview.

Apparatus and Facilities

Biofeedback sessions were carried out in an enclosed room in the Department of Psychology at the Edmonton Institution. Subjects were seated in a comfortable lounge chair facing a cabinet containing biofeedback equipment. The data acquisition equipment was on a separate table accessible to the experimenter, who was present in the room throughout the session. EMG levels were measured using an Autogenics Systems Incorporated 1700 electromyograph. EMG readings were obtained from standard silver-silver chloride

type electrodes placed on the occipito-frontalis muscle one inch above each eyebrow and four inches apart with a reference electrode in the center, connected to the myograph through a shielded cable, a procedure developed by Budzynski (1973). Impedence levels of less than 10,000 ohms were maintained throughout as recommended by the manufacturer. The EMG signal was processed through a 100-200 Hz frequency bandpass using a one second response averaging mode, as recommended by the manufacturer for general muscle relaxation training. Biofeedback was provided to the subject visually on a meter gauge which displayed the EMG level in microvolts, and auditorially by a variable frequency auditory clicking through a set of headphones.

EDR levels were measured using an Autogenics Systems Incorporated 3400 dermograph without feedback. Two active skin conductance electrodes were attached to the palmar surface of the second and third fingers of the dominant hand. The ground electrode was attached to the index finger of the dominant hand. Absolute conductance levels were monitored in micromhos. Each finger electrode had a contact area of one square centimeter and was attached to the finger by a velcro band.

The feedback myograph and dermograph were connected to optically isolated A/D converters, which in turn were

processed simultaneously through the data acquisition centre, which was calibrated to provide a microvolt/second integrated voltage value. The average level of response over 10 seconds of each minute was recorded by the printer unit during treatment sessions.

Research Design

Inmate volunteers were randomly assigned as experimental or control subjects. All subjects were administered a psychophysiological stress profile, where EMG and EDR levels were monitored without feedback. Control subjects were seen for a second psychophysiological stress profile following a six week waiting period. During this period, experimental subjects participated in a six week treatment program. The control group was subsequently trained and all subjects were seen for a post-treatment stress profile.

The A-State of the STAI, Form X-1, was administered to subjects as a pre-test prior to the six treatment sessions, and as a post-test on completion of training. All subjects were seen for two interview sessions before any biofeedback procedures were implemented. The initial session served as an introduction to the program. The So scale of the CPI was administered at this time. In the second session a release form was signed and a history relevant to the purposes of the study was taken.

Stress profile data was analyzed within a two (groups) by two (treatment) repeated measures across treatment phases format. Twelve analyses of variance were computed as EMG and EDR relaxation, stress, and recovery scores were input as mean and as median scores. Pre- and post-treatment STAI scores were subjected to a two (group) by two (treatment) repeated measures analysis of variance. Treatment data was analyzed within a one (group) by six (treatment) repeated measures format as experimental and control group data was examined independently. Neuman-Keuls comparisons among the means of the repeated measures were calculated. A two (group) by six (treatment) repeated measures analysis assessed the treatment effect for all subjects. Post hoc Scheffe comparisons were made between the main effects for each factor.

Inmate subjects were separated on psychological factors on the basis of behavioral criteria firstly, and secondly on the basis of scores on the So scale. Within these groups, the correlation of physiological similarities was considered through an examination of the distribution of chi-square.

Procedures

General procedures

In the initial interview, the experimenter introduced herself to each subject and gave a summary explanation of the biofeedback program and explained how the program may be helpful to the inmate. The subjects were questioned with respect to their expectations of the program and were asked if they had had any previous relaxation training. The answers to these questions were summarized on an interview form (Appendix B) on which were also recorded the subjects' complaints with respect to those physiological symptoms which tend to be associated with a stress response. This symptomology gave the experimenter an estimate of the intensity of the stress which the subject was experiencing. The interview was conducted in a relaxed manner with a secondary goal being to establish rapport, and to create an environment whereby the subject would not experience intimidation and would be willing to continue in the program. A form which reiterated the confidentiality of the procedure was signed and witnessed at this time (Appendix C).

In the second session, subjects were given the initial physiological stress profile (SPI), as described below. For the control subjects this session was followed by a six week waiting period followed by a second stress profile

(SPIA). For the experimental subjects, the Interview/History Questionnaire was administered (Appendix D) on the next session. This questionnaire, summarized from Robins (1966), asked for information with respect to childhood, school, family, personal troubles, personality change, and alcohol and drug use. In most cases, the questionnaire required one hour to administer. The So Scale from the CPI was also administered at this time (Appendix E). A volunteer research assistant collected a part of this data. The six EMG biofeedback training sessions were then administered over a period of six weeks, and were followed by a final physiological stress profile (SPII). Control subjects were similarly treated after the waiting period. After the administration of the final stress profile, the subject was encouraged to continue to use his newly learned relaxation skills, and in most cases a relaxation tape recorded by the researcher was given to the inmate to assist in this process.

Stress profile procedures

An initial psychophysiological stress profile was conducted with each subject to measure relaxation, stress reactivity and recovery with respect to EMG and EDR activity, in a modified version of a procedure developed by Stoyva (1979). The subject was seated and EMG and EDR sensors were attached to the subject. First the subject

was instructed to relax for a five minute adaptation period, during which time EMG and EDR levels were recorded and the experimenter assessed that all equipment and monitoring systems were recording properly. Quiet background music was provided to enhance relaxation. At the end of this period the subject was instructed to relax deeply for a 15 minute period with eyes closed. Following this 15 minute period, a period of stress was initiated in which the subject was instructed to subtract successive sevens from one thousand, out loud, as fast as possible, for a three minute period. Finally a five minute recovery period was conducted, during which time the subject was again instructed to relax with eyes closed. No feedback was given to the subject at any time during the stress profile sessions. (Appendix F). EMG and EDR readings were monitored at one-minute intervals. The stress response was calculated by averaging the readings obtained during the three-minute stress period. A similar stress profile procedure was conducted following the administration of six EMG training sessions.

Treatment procedures

Within each training session, following the placement of the EMG and EDR sensors, the subjects was allowed a five minute adaptation period without feedback, followed by three training sessions of five minutes each, where visual and aural EMG feedback was provided and the subject was

given instructions to relax in such a way that the needle on the machine would move to the left. A one minute rest period was provided between training sessions. EMG training procedures are described in Appendix G. Subjects were presented with a Rationale statement to be read on the first session (Appendix H). The rationale statement included an explanation of stages of biofeedback-guided relaxation and some strategies as to how to achieve a passive attitude. The experimenter verbally explained the rationale statement to the subject to insure understanding of what was written and to insure that the subject understood what was expected of him. At the end of each session, subjects were asked to describe the strategies which they had used successfully and to describe any feelings or sensations which they had experienced during the session as they relaxed. At the end of each session, subjects were shown their results and were given reinforcement regarding their progress. Subjects were encouraged to allow themselves a twice daily relaxation period where they employed the cognitive strategies which they found successful in the training sessions. As they became successful in these procedures, subjects were encouraged to apply their skills at any time during the day when a stressful situation was encountered.

Instruments

The California Personality Inventory (CPI)

The CPI, first published in its complete form in 1957, was developed by Harrison Gough as a comprehensive personality inventory to measure familiar well-known personality characteristics or folk concepts through the collection of information about typical behavior patterns. The CPI was designed for use with a wide range of populations and is a self-administered paper and pencil personality test. Originally designed for group administration, the test may be taken individually. The reusable question booklet contains 468 statements which the respondent answers as true or false for him/her on a separate answer sheet. The CPI is normally scored for 18 scales that Gough divided into four groups as an aid to profile interpretation.

Class I scales measure poise, ascendency, self-assurance and interpersonal adequacy. Class II scales assess socialization, maturity, responsibility, and intrapersonal values and includes the socialization scale. Class III scales relate to achievement potential and intellectual efficiency. Class IV is more assorted and may be said to measure interest modes.

The CPI is not a theory based instrument. Gough,

rather, developed his test to fit into existing constructs which he considered to be universal over all cultures and societies. Gough designed his test for practical validity; to describe and predict an individual's behavior, and therefore most of his own research on the test related to practical rather than construct validity, although he has been responsive to criticism and has made ongoing revisions over the years (Megargee, 1972). In the first edition, Gough listed 54 studies that had used or investigated the CPI. The number of investigations has continued so that by 1973 the literature contained more than 600 CPI studies . By 1972, normative data was available on 31 groups totalling 15,294 individuals (Megargee, 1972). Overall, the CPI seems to have gained the status of a major personality assessment instrument.

The socialization (So) scale

The present So scale consists of 54 items of which 22 are keyed true and 32 false. Megargee (1972, p.62) discusses item characteristics:

> "The manifest content of the So items, while not always obvious, is consistently with delinquency and research. A number of studies (cf., Glueck and Glueck, 1950; Rosenquist and Megargee, 1969) have demonstrated a relationship between delinquency and

a lack of cohesiveness in the family. It is hardly surprising to find a cluster of items dealing with feelings of warmth, satisfaction, and family stability as opposed to resentment and alienation in the family milieu: "The members of my family were always close to one another"-T; "My parents never really understood me"-F. Similarly, a negative world view has been found to characterize delinquents in this and other cultures (Rosenquist and Megargee, 1969), and a cluster of So items reflect optimism and self-confidence, in contrast to feelings of despondency, alienation or inferiority: "With things going as they are it is pretty hard to keep up hope of amounting to something"-F. .....A number of items reflect social sensitivity and empathy as opposed to ignorance of one's own stimulus value: "I often think about how I look and what impression I am making on others"-T. The final and most obvious group of items refer to scholastic and familial adjustment as opposed to waywardness and rebellion: "As a youngster in school I used to give the teachers lots of trouble"-F; "I sometimes wanted to run away from home"-F."

The So scale has been more thoroughly researched than any of the other scales in the CPI. It has been researched across cultures and this work has given support to Gough's

concept of cross cultural validity. The So scale has been translated into a number of languages and administered to offenders and non-offenders in a number of countries. In every nation tested significant differences have been found. (Gough, 1965; Gough and Sandhu, 1964, Mizushima and DeVos, 1967).

Most studies show the So scale to distinguish different levels of socialization within samples of offenders. Knapp (1963), and Peterson, Quay, and Anderson (1959) both found significant associations between So scores and indices of offense frequency. Hirt and Cook (1962) found that military offenders who were classified as acting out differed significantly from those with no psychiatric disorder. Gough (1969) published data where the mean So scores of various groups of offenders showed a systematic decrease in mean So scores as subjects moved from high school disciplinary cases to inmates of various correctional institutions. Megargee (1972) reported assaultive criminals to demonstrate higher So scores than nonassaultive criminals. Megargee theorizes that some assaultive offenders are characterized by excessive inhibitions and controls, which in reflected in their higher So scores.

Megargee cites numerous studies which impressively support the validity of the So scale. With respect to differences in socialization within nondelinquent samples, Gough published data which showed a progressive decrease in mean

So scores as one moves from High School best citizens at the upper end down toward psychology graduate students at the lower end, a finding he interpreted to support the construct validity of the scale. Other investigators have obtained data in support of the construct validity of the So scale, and have compared delinquents and nondelinquents in a number of countries. Offenders and nonoffenders in military samples have been compared in a number of studies. (Megargee, 1972). In one single study of the So scale, 26,824 subjects were tested in 10 countries. In summary, data has been gathered to demonstrate the concurrent, predictive, and construct validity of the CPI scale. The So scale is seen to be one of the best validated personality scales available.

The State Trait Anxiety Inventory (STAI)

The STAI, designed by C.D. Spielberger, R.L. Gorsuch, and R. Lushene in 1967 consists of two separate self-report scales designed to measure two distinct anxiety concepts, state anxiety and trait anxiety. The State Anxiety scale (A-State) measures transitory emotional states, as subjective consciously perceived feelings of tension,

nervousness, worry, and apprehension. The scores on the A-State have been demonstrated to increase in response to various kinds of stress and to decrease as a result of relaxation training (Spielberger et al, 1967). In contrast, the Trait Anxiety Scale (A-Trait) measures more stable individual differences in anxiety proneness. Anxiety proneness refers to the difference in tendency for an individual to perceive a situation as dangerous or threatening and to respond with subject anxiety. In general, those subjects who demonstrate high scores with respect to trait anxiety are expected to exhibit state elevations more readily and frequently than those who do not. In the present study, the A-State of the STAI, Form X-1 was used as a measure of perceived subjective anxiety (Appendix I). The STAI was designed to be self-administering and may be given individually or in a group. On the A-State, the subject is instructed to report how he feels at this moment. The scale consists of 20 multiple choice items, with subjects rating themselves on a four point scale. Possible scores range from a minimum of 20 to a maximum of 80. Of the 20 items, 10 are scored directly, and 10 are reverse scored to reduce the influence of an acquiescence set.

The STAI has been normed on large samples of high school and college students, on male psychiatric patients,

on medical patients, and on young prisoners. The data for the prisoners was obtained from the Federal Correctional Institution, Tallahassee, Florida, where the STAI was given to groups of inmates as part of the institution's classification and testing program (Spielberger et al, 1967.

With respect to test-retest reliability, correlations for the A-Trait scale ranged from 0.73 to 0.86, while those for the A-State scale ranged from 0.16 to 0.54. The low correlations for the A-State scale were anticipated by Spielberger as a reflection of unique situational factors which would exist at the time of retest. Both the A-Trait and A-State scales showed a high degree of internal consistency as assessed by item remainder correlations and measures of the alpha coefficient of each of the STAI scales (Spielberger et al, 1967). With respect to concurrent validity, correlations with the IPAT Anxiety Scale (Cattell & Scheier, 1965), the Taylor (1953) Manifest Anxiety Scale (TMAS) and the Zuckerman (1960) Affect Adjective Checklist (AAU) have been reported. Correlations have been shown to be moderately high between the STAI, the IPAT,and the TMAS. In contrast, the AAU was only moderately correlated with the STAI.

With respect to construct validity of the A-State scale, a large sample of college students at Florida State

University were administered the scale under standard conditions and under exam and stress conditions. Mean scores in the exam condition were considerably higher for males and females than in the standard or normal conditions (Spielberger et al, 1967). The STAI has been used in studies by other researchers as a measure of both state and trait anxiety. While few of these studies have focussed on concurrent validity, research has supported the conceptualization of trait versus state anxiety (Hodges and Felling, 1970).

CHAPTER 4

RESULTS

Experiment One

Question One

Question One relates to the learning effect of the EMG relaxation procedures as measured by pre- and post- stress profile EMG levels. A two-way analysis of variance (ANOVA) with repeated measures on one factor was employed to demonstrate the learning effect of the EMG assisted relaxation program, as measured by pre- and post-training stress profile EMG levels on both experimental and control groups. For the experimental group, pre-treatment relaxation, stress and recovery scores as measured on the initial stress profile (SPI) were compared to post-treatment relaxation, stress, and recovery scores as measured on stress profile two (SPII) which was administered after the final treatment session. Relaxation scores were averaged over the 15 minute relaxation period. Stress scores were averaged over the three minute stress period. Recovery scores were averaged over the five minute recovery period. Duplicate analyses were carried out using mean scores in the one instance, and median scores in the second case. Data on the control group was similiarly examined. For this group, the second stress profile (SPIA) was administered, not following treatment, but following a

six week waiting period.

Results of the ANOVA (N=36), using mean scores, demonstrated no significant group differences and no significant treatment effect under any of the conditions of relaxation, stress, or recovery. Results of the ANOVA (N=36) using median scores demonstrated no significant treatment effect under any of the conditions of relaxation, stress or recovery. Experimental and control group means (N=36) are listed in Table 1 . Summary tables for the Analyses of Variance appear in Appendix J.

These results seemed to contradict what had appeared to be clearly significant learning under the actual conditions of training. Examination of the raw data was made at this point and revealed that a sub-group of the 36 subjects demonstrated very high or erratic scores at certain periods in the stress profile and also when under training. These subjects appeared to be experiencing periodic muscle spasms which were seemingly independent of experimental conditions. Under the consideration that these very high scores may be masking the actual treatment effect, subjects who demonstrated EMG scores above 10 microvolts on at least three occasions under any of the experimental conditions were eliminated from the analysis. While 10 microvolts was the criterion for elimination, erratic reading were observed to be as high as 98

TABLE 1

Mean and Median EMG Levels in Conditions of Relaxation, Stress, and Recovery in Pre (P1) and Post (P2) Treatment Periods for Experimental (G1) and Control (G2) Groups (N=18, N=18)

			Relax	Stress	Recovery
Mean EMG Levels in Mu	G1	P1	2.463	5.861	2.610
		P2	1.870	7.478	2.078
	Difference		0.593	-1.617	-0.532
	G2	P1	3.508	6.100	1.577
		P2	1.886	7.083	2.221
	Difference		1.622	-0.983	-0.0644
Median EMG Levels in Mu	G1	P1	1.645	3.313	1.938
		P2	1.459	4.188	1.982
	Difference		0.186	-C.875	0.044
	G2	P1	1.823	2.707	1.474
		P2	1.669	3.101	1.934
	Difference		0.154	0.394	0.460

microvolts in one instance. Through this process of elimination, five subjects were eliminated from the experimental group, and three subjects were eliminated from the control group.

Results of the ANOVA for the reduced group (N=28) using mean scores demonstrated a significant treatment effect under conditions of relaxation: $F(1,26) = 7.023$, $p = 0.014$. No significant two-way interactions were obtained for the treatment variable. No treatment effect was demonstrated under conditions of stress. In recovery, a significant treatment effect was demonstrated: $F(1,26) = 7.087$, $p = 0.013$. Again, no significant interaction effect was obtained.

Results of the ANOVA for the reduced group (N=28), using median scores demonstrated a slight treatment effect under conditions of relaxation: $F(1,26) = 3.738$, $p = 0.064$. A small two-way interaction between groups was demonstrated. No treatment effect was demonstrated under stress. In recovery, no treatment effect was demonstrated. A slight interaction effect was indicated. Treatment group means for mean and median scores (N=28) are listed in Table 2.

These results indicate that EMG training can be effective with respect to learned muscular or central

TABLE 2

Mean and Median EMG Levels in Conditions of Relaxation, Stress, and Recovery in Pre (P1) and Post (P2) Treatment Periods for Experimental (G1) and Control (G2) Groups (N=13, N=15)

			Relax	Stress	Recovery
Mean EMG Levels in Mu	G1	P1	2.458	3.681	2.423
		P2	1.339	5.676	1.292
	Difference		1.119	-1.995	1.131
	G2	P1	1.879	3.841	1.827
		P2	1.543	4.294	1.487
	Difference		0.336	0.453	0.340
Median EMG Levels in Mu	G1	P1	1.738	2.902	1.871
		P2	1.052	2.648	1.227
	Difference		0.686	0.254	0.644
	G2	P1	1.300	2.708	1.275
		P2	1.263	2.117	1.564
	Difference		0.037	0.591	0.711

nervous system (CNS) control under conditions of relaxation and stress recovery. Autonomic response to stress seems to be unaffected. The experiment included a number of subjects who demonstrated very high EMG levels which confounded the initial experimental data. Mean scores are seen as a considerably more powerful measure of change than median scores. Such results may be expected as the mean score averages and includes all scores and therefore carries more information into the analysis.

Question two

Question two relates to the learning effect of the EMG relaxation procedure as measured by performance over treatment sessions. A one-way analysis of variance with repeated measures was performed to determine the effects of EMG training on muscle tension control as measured on the six training sessions. The one-way ANOVA was performed on the experimental and also the control group. Newman-Keuls comparisons among the means of the repeated measures were calculated. The analysis was performed with the reduced subject groups (N=13, N=15). A two way ANOVA was also performed to measure training effects with experimental and control groups (N=28). Analyses were conducted using mean and median scores.

The ANOVA on the experimental group (N=13) demonstrated a significant treatment effect, using mean

scores: $F(5,60) = 3.40$, $p == 0.009$. Neuman-Keuls comparison for mean differences demonstrated significance between treatment periods one and three, periods one and five, and periods one and six. The significant change in period three was lost in period four. These results suggest that five or six sessions are necessary to maintain a meaningful training effect. The ANOVA using median scores indicated a lesser treatment effect on the experimental group: $F(5,60)= 2.03$, $p = 0.09$. The ANOVA on the control group (N=15) demonstrated no significant treatment effect with mean scores. However, some treatment effect was demonstrated with median scores: $F(5,60) = 2.53$, $p = 0.037$. These results seem to indicate that a subject or subjects with unusually high or erratic EMG levels remain in the sample and that these scores, even though they are below the criterion for removal of a subject, have obscured the training effect when mean scores were used. Examination of the raw data revealed that, indeed, two subjects sustained above average EMG levels over a continuing period of time, although these levels did not reach the criterion for omission. Newman-Keuls comparisons did not demonstrate significance. Treatment group means and medians for the one-way analyses of variance are listed in Table 3.

When the experimental and control subjects (N=13,N=15) were examined with a two-way ANOVA using mean scores, a significant treatment effect was demonstrated: $F(5,130) =$

TABLE 3

Mean and Median EMG Levels in each of the Six Treatment (Tr) Periods for Experimental (G1) and Control (G2) Groups (N=13,N=15)

		Tr1	Tr2	Tr3	Tr4	Tr5	Tr6
Mean EMG Levels in Mu	G1	2.196	1.366	0.772	0.965	0.753	0.621
	G2	1.371	1.404	1.288	1.177	0.825	0.813
	Difference	0.825	0.962	-0.516	0.212	-0.072	-0.192
Median EMG Levels in Mu	G1	1.655	1.622	0.732	0.906	0.666	0.592
	G2	1.019	1.045	1.071	1.125	0.751	0.696
	Difference	0.636	0.577	-0.339	-0.219	09.085	-0.104

4.614, p = 0.001. Scheffe comparisons of unweighted main effects demonstrated significance between sessions one and five (p=0.016), and sessions one and six (p=0.007). Using median scores, the two-way ANOVA demonstrated a lesser treatment effect: F(5,130) = 3.122, p = 0.011. The groups means and medians for this analysis are as in Table 3.

In summary, a very strong treatment effect in the experimental group was demonstrated. The treatment effect in the control group seemed to be confounded with extreme scores in the control group. When the groups were collapsed, the strength of the treatment effect in the experiment group overrode the lesser treatment effect in the control group and significance was maintained. Means are seen as the more powerful measure, as compared to median scores, although medians will demonstrate change when means are confounded by extreme scores.

Question three

Question three relates to the learning effect of the EMG relaxation procedures as measured by pre- and post-scores on the STAI. A two (group) by two (treatment) ANOVA was conducted on standard scores obtained on the A-State, (N=35), as normed with a prison population. Standard and percentile scores are shown in Table 4. The analysis of variance under pre- and post-treatment conditions

TABLE 4

Standard Scores and Group Means on the A-State of the STA, Form X-1, in Pre (P1) and Post (P2) Treatment Periods for all subjects (N=35)

	Standard Scores	
Group 1 (Experimental)	P1	P2
01	41	41
02	54	45
03	57	41
04	43	45
05	49	35
06	44	45
07	49	48
08	66	57
10	55	44
11	38	35
12	72	58
13	51	33
14	62	64
15	53	44
16	59	37
17	61	38
18	54	53
Group 2 (Control)		
19	43	33
20	40	34
21	54	41
22	54	51
23	59	49
24	48	34
25	46	42
26	57	63
27	63	51
28	67	51
29	49	47
30	61	57
31	57	43
32	62	43
33	57	40
34	57	51
35	59	61
36	55	49
	Means	
Group 1	53.412	44.882
Group 2	54.889	46.667

demonstrated a highly significant treatment effect: $F(1,33) = 42.18$, $p = 0.000$. No significant group differences were indicated. The treatment group means are also listed in Table 4. One subject failed to complete this pencil and paper inventory. As the results demonstrate, subjects reported extremely positive feelings with respect to the biofeedback training program. The majority of subjects reported themselves to be experiencing an improved sense of well-being, and a substantial number of the group requested further involvement in a biofeedback training program.

Experiment Two

Question one

Question one addresses the correlation of muscle tension reduction with changes in autonomic responsivity in pre- and post- stress profile scores. EDR pre- and post-stress profile data demonstrated no significance with respect to relaxation, stress, or recovery scores, in either experimental or control subjects, whether mean scores or median scores were compared. No correlation with EMG training effects was demonstrated. Stress profile group means for mean and median scores are listed in Table 5.

TABLE 5

Mean and Median EDR Levels in Conditions of Relaxation, Stress, and Recovery in Pre (P1) and Post (P2) Treatment Periods for Experimental (G1) and Control (G2) Groups (N=13, N=15)

			Relax	Stress	Recovery
Mean EDR Levels in Mmhos	G1	P1	9.067	15.166	12.198
		P2	6.488	12.413	9.587
	Difference		2.579	2.753	2.611
	G2	P1	5.129	10.097	7.104
		P2	6.998	12.061	9.403
	Difference		-1.869	-1.964	-2.299
Median EDR Levels in Mmhos	G1	P1	8.395	14.907	11.972
		P2	6.398	12.405	9.266
	Difference		1.997	2.502	2.706
	G2	P1	4.967	10.077	6.777
		P2	6.895	11.725	8.973
	Difference		-1.928	1.648	-2.196

Question two

EDR training data demonstrated no significance with respect to any treatment session, in either experimental or control subjects, whether mean or median scores were compared. No correlation with EMG training effects was demonstrated. Treatment groupo means for mean and median scores are listed in Table 6.

The results indicate that EDR levels appear to be influenced by multifactoral conditions, so that absolute SC levels are seen to be a meaningless measure of autonomic responsivity as compared between sessions. Examination of the raw data in SPI show that during the relaxation period 25 subjects demonstrated steadily falling SC levles, one subject demonstrated a steadily increasing SC level, and 10 subjects demonstrated fluctuatin or relatively constant SC levels. Under training conditi9ons, SC levels did not demonstrated any readily observable pattern.

Experiment Three

Question one

Question one examines the relationship of behavioral characteristics to electrodermal responsivity scores. Inmate subjects were grouped on the basis of behavioral criteria with behavioral data taken from the Interview/History Questionnaire and verified through the

TABLE 6

Mean and Median EDR Levels in each of the Six Treatment (Tr) Periods for Experimental (G1) and Control (G2) Groups (N=13, N=15)

		Tr1	Tr2	Tr3	Tr4	Tr5	Tr6
Mean EDR Levels in Mmhos	G1	10.792	8.417	9.069	10.917	10.017	11.672
	G2	6.602	7.349	6.728	10.219	8.345	7.154
	Diff.	4.190	1.068	2.341	0.698	1.672	4.518
Median EDR Levels in Mmhos	G1	10.615	8.156	8.938	10.721	10.158	11.611
	G2	6.481	6.701	6.201	10.095	8.403	7.034
	Diff.	4.134	1.455	2.737	0.626	1.755	4.577

examination of Institutional files. Antisocial behaviors as substantiated and known to the examiner were classified into 12 categories (Table 7). Subjects were grouped following Robins (1966), on the basis of the number of antisocial behaviors exhibited. In this manner, three subject groupings were formed. Group I(AntiS) exhibited the fewest number of antisocial behaviors and would not meet the criteria for classification of antisocial personality as described in the DSM-III (1980). Group II(AntiS) demonstrated a more pronounced history of antisocial behaviors and appear to meet the criteria in order to be classified as ASP. Group III(AntiS) subjects exhibited antisocial behaviors in most or all of the categories of antisocial behavior as categorized in Table 7. Subjects in this category generally surpassed the definition of ASP as classified in the DSM-III.

On the basis of these psychological or behavioral distinctions, no significant differences between groups was demonstrated with respect to EDR stress responsivity. Subjectgs were separated with respect to EDR stress increments on the basis of a median split based on the differences scores between the average of the last three minutes of relaxation and the average of the three minuetes of stress in the pre-treatment stress profile. A trend was demonstrated in that subjects in Group I(AntiS) tended to demonstrate a higher EDR stress response than either Group

TABLE 7

Categories of Antisocial Behaviors Used to Distinguish Subjects on a Behavioral Basis

1. Problems in childhood, as indicated by persistent fighting, running away from home, early delinquency or substance abuse;
2. School problems, as indicated by truancy, suspension for misbehavior, and repeated involvement in fights;
3. Poor school performance, as indicated by low grades, or failure of a grade;
4. Juvenile arrests, with arrests or referrals made to a juvenile court before age fifteen;
5. Irritability and aggressiveness, as indicated by a pattern of repeated physical fighting as an adult;
6. Inability to sustain consistent work behavior, as indicated by frequent job changes, or significant periods of unemployment;
7. Inability to accept social norms as indicated by a history of unlawful behavior and multiple arrests;
8. Lack of an enduring relationship with a mate or sexual partner, as indicated by the absence of any significant relationship, or two or more separations;
9. Recklessness, as indicated by a love of excitement and driving fast;
10. Excessive drug or alcohol abuse, as indicated by job loss, arrests, family difficulties, or physical symptoms, as a result of substance use;
11. Carelessness with money, as indicated by failure to meet debts, or support self or dependents on a regular basis;
12. Impulsivity, as indicated by abrupt job termination, aimless travel, or frequent moves.

II(AntiS) or Group III(AntiS). Table 8 lists the three groups as defined on the basis of antisocial behaviors along with individual and group physiological differences.

Question two

Question two addresses the relationship of behavioral characteristics to electrodermal stress recovery. Inmate subjects grouped on the basis of behavioral criteria did distinguish with respect to autonomic responsivity as measured by EDR stress recovery when recovery was measured as a greater than 50% return to pre-stress levels, based on the difference between the average of the three-minute stress period and the average of the last three minutes of the recovery period in the pre-treatment stress profile. Group III(AntiS), which included subjects with the highest number of antisocial behaviors demonstrated a chi-square value of 3.94 (critical value = 3.84). This group was significantly more able to recover to pre-stress levels than were subjects in the first two groups. Neither Group I(AntiS) or Group II(AntiS) demonstrated recovery rates which differed from expected frequencies.

Question three

Question three examines the correlation between the scores on the So scale and electrodermal stress responsivity. Inmate subjects grouped on the basis of the So scale of the CPI did not distinguish in any significant

TABLE 8

Physiological Differences as Measured in the Experiment within Subject Groups Distinguished on the Basis of Behavioral Criteria

I. D.	Anti Social Behaviors	SC not fall in relax	Erratic EMG	Hyporeact to stress EDR	Recover to stress EDR	Cannot Subtract 7's	I. Q.	Admit to rage	Current Conviction
28	1				✓		Av.		murder
27	3	✓	✓				Av.		murder
07	4						H.A.		murder
22	4				✓		H.A.		murder
11	5						H.A.		murder
06	5	✓		✓		✓	H.A.	✓	murder
21	5			✓	✓		H.A.		murder
23	6	✓	✓	✓	✓	✓	Av.		hostage take
17	6	✓				✓	H.A.		murder
35	6	✓				✓	Av.		murder
10	7	✓		✓	✓		L.A.		imp. narcotics
16	7					✓	L.A.		B & E
08	7		✓			✓	L.A.	✓	murder
34	8			✓	✓		Av.	✓	murder
33	8	✓		✓	✓		Av.		B & E
29	8	✓		✓			Av.	✓	murder
32	8				✓		L.A.	✓	armed robbery
13	9	✓		✓			H.A.		armed robbery
20	9			✓	✓		S		armed robbery
19	9	✓		✓			Av.		armed robbery
05	9	✓			✓		Av.		armed robbery
12	9			✓		✓	Av.		armed robbery
15	9	✓		✓			Av.		armed robbery
03	10	✓	✓		✓		S		murder
02	10	✓	✓		✓	✓	L.A.	✓	murder
30	10	✓		✓	✓		Av.	✓	aggressive assault
09	10	✓	✓	✓		✓	L.A.	✓	murder
18	11	✓	✓		✓	✓	Av.	✓	murder
26	10	✓		✓	✓	✓	Av.		murder
36	11			✓	✓		Av.	✓	murder
04	11			✓	✓	✓	B.D.	✓	murder
25	11	✓	✓		✓	✓	Av.	✓	assault & robbery
01	12		✓		✓	✓	Av.	✓	armed robbery
31	12	✓			✓		Av.	✓	murder
14	12	✓	✓		✓	✓	L.A.	✓	armed robbery
24	12			✓	✓	✓	L.A.	✓	murder

manner between groups as measured by EDR stress increments. A slight trend was demonstrated in that subjects in Group III (So), the most pro-social group, tended to exhibit higher EDR increments in response to stress.

Question four

Question four examines the correlation between the scores on the So scale and electrodermal stress recovery. Inmate subjects grouped on the basis of the So scale of the CPI did not distinguish in any significant manner between groups as measured by EDR stress recovery (Table 9). A slight trend was demonstrated in that subjects in Group I(So) tended to exhibit a greater rate of recovery from stress.

The correlation between groups designated on behavioral criteria, and groups designated on the basis of So scores was examined. Group I(AntiS) included all but two of the subjects in Group I(So). Group III(AntiS) included all but three of the subjects in Group III(So). In Group I(AntiS), the mean So scale score was 29.62 In Group II(AntiS), the mean So scale score was 24.50 In Group III(AntiS), the mean So scale score was 21.77 A degree of correspondence appears to exist between the So scale and antisocial behavioral indices.

TABLE 9

Physiological Differences as Measured in the Experiment within Subject Groups Distinguished by the So Scale of the CPI

I.D.	So Score	SC not fall in relax	Erratic EMG	Hyporeact to Stress EDR	Recover to Stress EDR	Cannot Subtract 7's	I.Q.	Admit to Rage	Current Conviction
28	36				✓		Av.		murder
10	35	✓		✓	✓		L.A.		narcotics exp.
33	34	✓		✓	✓		Av.		B & E
27	32	✓	✓				Av.		murder
06	32	✓		✓		✓	H.A.	✓	murder
11	31				✓		H.A.		murder
07	30						H.A.		murder
21	30		✓	✓	✓		H.A.		murder
35	30	✓				✓	Av.		murder
16	29					✓	L.A.		B & E
22	27				✓		H.A.		murder
15	27	✓		✓			Av.		armed robbery
13	27	✓		✓			H.A.		armed robbery
20	27			✓	✓		S		armed robbery
05	26	✓			✓		Av.		armed robbery
08	26		✓			✓	L.A.	✓	murder
03	26	✓	✓		✓		S		murder
26	25	✓		✓	✓	✓	Av.		murder
36	25			✓	✓		Av.	✓	murder
25	24	✓	✓		✓	✓	Av.	✓	assault/robbery
17	24	✓				✓	H.A.		murder
29	24	✓		✓			Av.	✓	murder
24	23			✓	✓	✓	L.A.	✓	murder
23	23	✓	✓	✓	✓	✓	Av.		hostage take
32	23				✓		L.A.	✓	armed robbery
31	23	✓					Av.	✓	murder
01	22		✓		✓	✓	Av.	✓	armed robbery
02	21	✓	✓		✓	✓	L.A.	✓	murder
18	21	✓	✓		✓	✓	Av.	✓	murder
19	20	✓		✓			Av.		armed robbery
09	20	✓	✓	✓		✓	L.A.	✓	murder
34	19			✓	✓		Av.	✓	murder
14	18	✓	✓		✓	✓	L.A.	✓	armed robbery
30	18			✓	✓		Av.	✓	agg. assault
12	18			✓		✓	Av.		armed robbery
04	17			✓	✓	✓	B.D.	✓	murder

CHAPTER FIVE

DISCUSSION

This chapter discusses the results of the three experiments and the questions addressed in the study. Uncontrolled variables are considered and theoretical hypotheses are presented.

Methodological considerations in the establishment of psychological distinctions are discussed, with groups being eventually distinguished on a behavioral basis. Environmental, psychological, physiological, and behavioral differences between groups are discussed. Concluding statements reflect on the significance of these differences.

Experiment One

With respect to research question one, inmate subjects under study demonstrated significant learning in the acquisition of muscle tension control through six biofeedback training sessions, as measured by pre- and post-training relaxation levels, and through the analysis of mean scores in the six training sessions. Results indicate that a maximum of five or six training sessions is necessary for such learning to take place. Inmate subjects

who completed the training process expressed a significant reduction in intrapsychic anxiety following treatment as indicatedby results of the STAI. These changes were assessed immediately following the conclusion of the training sessions. Follow-up assessments of physiological or psychological change at a later date may demonstrate an undetermined loss of the training effect, as situational changes occur, and as the inmates experience attitudinal change through time. A number of subjects, particularly in Group III(AntiS) were observed to demonstrate rapidly vacillating mood changes with little provocation, and only a small percentage of all subjects are judged to have the capacity to practice learned relaxation skills independently over a period of time. The relaxation tape was given to the inmates at the end of the training sessions to provide assistance in this regard. Following training, a number of inmates expressed an ability to non-respond to provocations from the prison guards, and expressed satisfaction with this newly acquired sense of power. The experimenter felt like a subversive agent in this regard.

The experimenter is of the opinion that relaxation training over perhaps a six month period would be considerably more effective with respect to long-term change. Reaction patterns which are developed and habituated over a period of many years are not readily

transformed. Over longer periods, inmates also tend to develop trust and hence be more responsive to psychotherapeutic intervention. While such relatively long-term training may be considered to be expensive, such costs may be weighed against the greater costs of continued violent responsivity on the part of the subject, and the attendant complications therein. The immediate and sometimes dramatic short-term changes which have been seen to occur in the inmates under study suggest that physiological training of this nature may be an entry point for change in a population not readily amenable to change.

The degree to which drug consumption affected the results of the experiment is unknown. Health Care personnel in the Institution maintained records of all medications prescribed and administered to inmates. This information was kindly shared with the experimenter. The most commonly allocated medications were analgesics, mild tranquillizers, sleeping medications, and in some cases muscle relaxants. Of the the 36 subjects under study, 24 four consumed some form of prescribed medication. The consumption of illicit drugs, which were reported to be widely and habitually used, could not be documented.

Inmate subjects appeared to enjoy the training process. The majority of subjects who attended seemed to be genuinely interested in helping themselves. All

subjects were shown the printout of their results at the end of each session. They would return the following week expressing an interest to surpass their previous performance. The inmates discussed the altered sense of consciousness which they achieved in this way. Some said that the experience was equivalent to the high achieved through drug usage. With respect to stress management or relaxation skill acquisition, the experimenter judges that biofeedback training or experiential learning is the treatment of choice for inmate subjects as this subject group is not generally amenable to lecture or direct suggestion.

Inmate subjects who completed the program attended sessions with remarkable constancy. The experimenter learned to facilitate this process by setting personal appointments with the inmate rather than relying exclusively on the call-up process. Alternately, drop-out subjects did not demonstrate this measure of reliability. The experimenter can only hypothesize as to what secondary gain was achieved for some subjects through the biofeedback training process. A number of subjects were obviously interested in gaining a statement to be placed in their file, indicating that they had completed a self-help program. Other subjects clearly liked to be excused from their work situation. The experimenter had thoughts that a sub-group of subjects were interested to come to the rather

isolated area where the experiment was conducted for reasons of opportunism. The sample of inmates in the study was not a truly representative sample of subjects in the Institution, as a number of inmates refused to enter the Department of Psychology in the prison, as such action could be construed as consorting with the other side.

With respect to the inmate subjects who demonstrated highly erratic EMG readings, the experimenter hypothesizes that these subjects may also experience substantial benefit from extended relaxation training. Such periodic tensions may relate to intrapsychic discomfort and correspondingly erratic behavior, as such behavioral correlations were observed by the experimenter. Such pronounced muscle tension reactivity has not been observed by the experimenter in any subject outside of a prison population. A number of the subjects who dropped out of the experiment were those who demonstrated such erratic responses. The experimenter perceived that these subjects were uncomfortable in their own awareness of this erratic feedback, in spite of explanations and reassurances on the part of the experimenter. The writer has not encountered any descriptions of this sort of erratic responsivity in the literature and can only hypothesize as to a connection between such apparent physiological distres and erratic or unpredictable behavior. further reearch with such subjects would surely be warranted in this regard.

In summary, EMG training was effective in the short term. Long term effects are speculative and may be better achieved through a longer and more extensive training process. Habitual responses are not easily unlearned, particularly within a subject group who tend not to demonstrate internal self-control or future orientation. Those subjects who demonstrate erratic EMG activity merit further study.

Experiment Two

With respect to Experiment Two, subjects under study who learned central nervous system control did not demonstrate a corresponding effect with respect to autonomic reactivity as measured by EDR levels in pre- or post-treatment conditions or within the actual training sessions. Variations in absolute SC levels between sessions is known to be affected by environmental or situational conditions. Variation of SC levels within a session may be more a measure of emotional responsivity. Observation of the raw data indicates that SC patterns of change for individual subjects seems to be relatively consistent in conditions of relaxation, stress, and relaxation when pre-treatment or post-treatment stress profiles are compared, although the absolute levels may vary. Subjects did not demonstrate a greater drop in SC in periods of relaxation in the post-treatment stress profile

as may have been expected, although for the majority of subjects, SC levels lowered steadily in the condition of relaxation. In the training situation, no observable trend was apparent through the observation of the raw data. SC change within the treatment session did not appear to correspond to the observed decrease in EMG levels in the feedback situation. The findings do not support Gellhorn and Kiely (1973) or Budzynski (1972) who suggest that deep muscle relaxation induces corresponding change in autonomic or parasympathetic discharge. Possibly the subjects under study did not generally relax to the extent that such an effect would be demonstrated.

Experiment Three

With respect to Experiment Three, the method by which subjects would be separated on psychological factors was the focus of considerable concern to the experimenter. The original plan was to use Hare's 22 item research scale (Hare, 1980). This checklist scale which had been researched for reliability and validity was judged to contain intrapsychic characteristics which were difficult to assess under the conditions of the present experiment, and which also required the input of two experienced and independent raters. As such resources were not readily available, the decision was made to distinguish groups on the basis of behavioral criteria. An Interview

Questionnaire, summarized from Robins (1966) was used. The DSM-III was used as a guide to include questions to provide such behavioral information relating to antisocial behaviors as was judged that subjects would be able and willing to provide. Questions on sexual behavior were omitted, as in a pilot study the experimenter was made aware that inmates were not willing to discuss this subject with her. Also taboo was discussion of the inmate's current beef or offense. Examination of Hare's revised Psychopathy Checklist (Hare, 1985), which remains true to Cleckley's criteria of psychopathy, makes clear to the experimenter that not all subjects who may be classified as an antisocial personality meet the criteria for Cleckly's definition of psychopathy as a classical entity. At the same time, groups defined on the basis of behavioral criteria demonstrated a number of interesting characteristics. Groups separated on the basis of the So scale, although correlated to the behavioral groupings, did not separate clearly on psychological or physiological characteristics.

Group I(AntiS), the least antisocial group, had thehighest So scale mean score (29.62). None of these subjects were judged to fit the definition of psychopathy using Hare's Psychopathy Checklist, as rated by the experimenter. From a sociological aspect, as a group, these subjects described their childhood and early family

life as satisfactory. In all cases but one, these subjects grew up in two-parent homes without poverty. They said that their parents took good care of them, and happy childhood memories were described. As a group, these subjects demonstrated intrapsychic anxiety and pain with respect to their current situation. Most subjects admitted to extreme alcohol or drug abuse. All but one of the subjects described themselves as reckless, liking to drive fast and seek excitement, especially in their younger years. A number of these subjects said that they had been called hyperactive as a child. Six members of the group had a College or University education. The mean I.Q. for the group was 101 (pro-rated). Six of the subjects had I.Q. scores in the High Average range. Although as a group, these subjects had a comparatively limited criminal history, most had been sentenced under charges of first or second degree murder, and the victim was in most cases an associate or family member, a so-called crime of passion. In the present experiment, 4 of the thirteen subjects in the group demonstrated abnormally high muscular tension, and nine of the subjects failed to recover from stress as measured in the experimental condition. Institution filesprovided information that at least three subjects in the group had some diagnosed neurological abnormality, and these same three subjects admitted to experiencing periods of uncontrollable rage. Five subjects in the group were virtually unable to subtract serial seven's as required in

the stress profile procedure, with any degree of accuracy. Primary factors in the development of criminality in this group seem to be less sociological, but more a function of physiological or psychological factors. Megargee (1972) identified similar criminal subjects with relatively higher So scores, who he suggested acted out of overcontrolled hostility.

Group II(AntiS) had a So scale mean score of 24.4. While the subjects in this group generally met the DSM-III criteria for the diagnosis of ASP, only six of the 10 subjects in the group are judged by the experimenter to meet the criteria of psychopathy using Hare's revised Psychopathy Checklist. From a developmental and sociological aspect, subjects in this group described unhappy childhood experiences with alcoholic and abusive fathers. Cruel and violent beatings were described. Antisocial behaviors tended to begin at a young age, before adolescence in most subjects. The majority of subjects in the group lived at home with one or both parents until their early teens when they either ran away, or were placed in a training school. All subjects but one admitted to extreme alcohol abuse. This same subject was the only group member who did not describe himself as reckless or loving excitement and fast driving. As a group, these subjects tended not to be embarrassed or terribly unhappy in their current situation, and a sub-section of this group

presented what seemed to be realistic rehabilitative plans and attended institutional classes. As a group, these subjects generally had less than a complete High School education. The mean I.Q. for the group was 95.6 (pre rated). Although members of this group demonstrated long and active criminal histories, they tended not be murderers. Most sentences were given for armed robbery, or repeated drug offenses. In the current experiment, this group tended to be hyporeactive to stress with respect to SC levels. No other indicators of psychoneurological dysfunction were evidenced. Institutional files contained no records of medical diagnoses which may affect behavior, although one subject in the group had three immediate family members who had had Huntington's Chorea. The hyporeactivity to stress which these subjects demonstrated is hypothesized to be a conditioned response developed as a protective mechanism to repeated abuse in childhood. Three subjects in the group admitted to uncontrollable rage, a response which may have developed through early childhood experiences as well. All but one of the subjects in this group could easily subtract the serial seven's as presented in the stress profile. As a group these subjects were seen to demonstrate flat emotional affect and pronounced antisocial attitudes.

Group III(AntiS) had a So scale mean score of 21.42. Subjects in this group easily met the DSM-III criteria for

ASP and all but two of these subjects are judged to meet Cleckley's criteria for psychopathy, using Hare's Psychopathy Checklist (1985), as judged by the experimenter. From a developmental and sociological aspect, subjects in this group described early emotional impoverishment, abusive alcoholic fathers, financial insecurity, and in a number of cases, early placement in foster homes. Serious crimes were committed at an early age. A history of multiple arrests and criminal versatility was described. Institutional records revealed that criminal histories in most cases included repeated violence. The majority of these subjects were serving life sentences for murder. Their victims tended to be other than family members. The experimenter theorizes that those subjects in the group who have not yet committed a murder, are likely candidates to do so in the future. These subjects tend to demonstrate unpredictable mood changes, poor behavioral controls, and superficial or shallow affect, as befitting the classical description of the psychopath. These subjects tend to blame others, including the correctional and judicial systems, for their troubles. A number of subjects in the group had no high school education. They tended not to be interested in self improvement courses. All admitted to recklessness, excitement-seeking behaviors, and all admitted to excessive alcohol or drug usage. The mean I.Q. for the group was 87.2 (pro rated). Verbal scores were generally lower than

performance scores. Although Institutional files did not present psychoneurological diagnoses in most cases, indices of physiological abnormalities were noted in the current experiment. The majority of subjects demonstrated erratic EMG readings. Subjects ranged from hypo- to hyper-reactivity to stress as measured by EDR stress levels. The group demonstrated significance in their ability to recover from stress as defined in the experiment. This ability to recover readily from stress may coincide with the inability to develop a conditioned fear response or conventional social learning ,as per the theories of the social learning psychologists (Ullman & Karasner, 1969). Few subjects in the group were able to subtract serial seven's accurately. All but one of the subjects admitted to periods of uncontrollable rage.

In summary, the three groups which separate on the basis of antisocial behaviors seem to distinguish in other respects. The least antisocial group of subjects tend to have relatively limited criminal careers which which have for the most part culminated in murder. Most commonly, for these subjects, the murdered victim was an associate or family member. This group demonsttrated the highest educational and intellectual levels of the subjects under study. The possibility of psychoneurological dysfunction is suggested for at least a portion of the group. Subjects in the group appear to suffer in the prison environment.

The second group of subjects tend to commit crimes more for personal gain. This group includes professional bank robbers and drug dealers. These subjects are average in intelligence. Antisocial attitudes are more apparent in this group, and descriptions of family background and social history include alcoholism, fighting and child abuse. In the experimental situation, these subjects did not demonstrate physiological abnormalities, although they tended to be hypo-reactive to stress. The third group of subjects, who demonstrated the highest number of antisocial behaviors demonstrated varied and frequent criminal behaviors. Their criminal careers culminated in murder for the most part. These murders tended to be non-family members and were committed in what is commonly called cold blood. This group is of lower intelligence with limited education. Family backgrounds, as described, tended to involve fighting, abuse, and frequently separation from home at an early age. These subjects present a multiplicity of physical and emotional problems. These subjects tended to demonstrate unusual mucle spasm activity and autonomic responsivity sufficient to recommend examination for psychoneurological impairment. Psychoneurological differences are suggested through responses demonstrated in the conditions of the experiment.

Finally, the experiment presents certain conclusions. Separation of inmate subjects on the basis of antisocial

behaviors correlates, to some degree, with the So scale. Subjects distinguished on the basis of behavioral criteria as ASP are not necessarily psychopathic, although psychopaths are found more frequently at the severe end of the scale.

Three distinct types of criminals were isolated in the study:

a) one group who committed fewer crimes and were distinguished by enduring individual characteristics;

b) a second group whose criminality had seemingly developed through sociological or environmental factors; and

c) a third group which included the most violent and persistent criminals under study, who had endured environmental impoverishment, and whose responses in the experiment suggest the presence of physiological abnormalities.

Results of the experiment suggest that current policies of incarceration for criminal subjects rate re-examination. For those least antisocial subjects who are currently serving a life sentence, and who demonstrate a commitment to self-understanding and self-help, life

imprisonment may not be the most practical or humane solution. For such subjects, psychotherapy and situational guidance may be helpful. As these inmates may be able to gain in insight and understanding of the heretofore uncontrolled dynamics which have governed their behavior, the motivation appears to exist to modify such behaviors, with support and guidance. In most of such cases, treatment for drug and alcohol abuse would appear to be critical.

Subjects in the second group are judged to rate further assessment. A number of subjects in this group seem to be legitimately struggling to overcome the disadvantages of their childhood and present situation. A greater degree of societal support may reduce the rate of recidivism for these subjects. A certain subsection of this group appears to be genuinely seeking to better their life situation and to develop lawful means to gain financial and material comfort. Such change in most cases is dramatic and would involve ongoing behavioral and value re-orientation. The costs of such support can only be measured against the costs of continued recidivism and incarceration. A further subsection of this group is seemingly committed to antisocial and unlawful behavior with an awareness that incarceration is a part of this process.

For the third group of subjects under study, for reasons of general protection to society, incarceration is seen to be the only currently feasible solution. These subjects are erratic and unpredictable in physiological, psychological and behavioral dimensions. The genesis of criminality in these subjects needs continued study and understanding. In the majority of these cases, the precursors of future criminal behavior are present at an early age. The writer is of the opinion that only early intervention would be able to reverse the development of criminality in these subjects. As young children demonstrate school problems, deviancy, and hyperactivity, early diagnosis and specialized attention from sociological, psychological and physiological perspectives may act to reduce human suffering and financial cost in this regard.

In summary, the identification of inmate subjects on the basis of behavioral criteria on a quantitative scale, with avoidance of the process of <u>labelling</u> has led to the identification of three criminal groups distinguished by qualitative differences. Identification of such differences leads to the proposal that inmate subjects who are currently grouped together within a maximum security setting be identified as per these characteristics, and as such receive differential treatment. In certain identified groups, individual treatment and community support are

judged to be able to reduce current recidivism rates. If such programs have been judged to fail in the past, failure may have occurred as the program applied failed to meet specific individual needs.

With respect to the definitions of psychopathy and sociopathy as historically applied, both terms may be misleading as applied to criminality. Antisocial behaviors appear to be a function of physiological and sociological factors, not either/or, although in individual cases, one factor or the other may dominate. Where both physiological and sociological concommitants are significant, individual deviancy is most incorrigible. While Cleckley's psychopath seems to coincide with this group of subjects, his term is not exclusive to this group, and seems to confound the study of criminal subjects. Following Robin's carefully documented study (1966), the frequency of antisocial behaviors through childhood, adolescence, and adulthood appears to be significant, and in fact lead to qualitative distinctions. The precursors of serious adult criminality seem to be evident as behavioral characteristics in early childhood.

With reference to the nature of these physiological characteristics, Hare and Quinn's (1971) work which studied the inability of the persistant criminal to learn avoidance behavior is supported in the present study. In Hare and

Quinn's study, subjects demonstrated low fear arousal and consequently were not subject to avoidance learning whereby a strong fear response would be reduced. Quay (1965) presented a similar theory which described subjects with diminished reactivity or adaptation of all types of sensory input and a consequent inability to learn adaptive behavior. Hare (1970) suggests that such subjects may engage in stimulus-seking behavior as compensation for chronic low arousal level. This theory is not inconsistent with the present study, as demonstrated by the subjects in Group II(AntiS). Researchers such as Woodman and Hinton (1978) present an opposing theory that the persistent criminal demonstrates a greater magnitude and faster rate of change in arousal level than normal individuals. Such conclusions are not supported in the present study, although their conclusiions may be appealing on a theoretical or logical basis.

With reference to the work of researchers such as Hall, Hall and Lavoie (1978), Flor-Henry (1978) and Tucker (1981) who focus on laterality in cognitive functioning, the group of subjects identified in this study as most persistently criminal, demonstrated rather consistently lowered verbal functioning. Verbal functioning is, in most cases, mediated by the left hemisphere. Hall, Hall, and Lavoie comment on the role of the left hemisphere as censor or control mechanism over behavior. Observation of the

subjects under study suggests that those who were most significantly deviant (Group IIIAntiS) tended to demonstrated lowered verbal functioning as measured on the Wechsler Adult Intelligence Scale-Revised. These subjects appeared to demonstrate poor inhibitory behavioral controls. The results of this study support the theories of researchers like Hare (1978) who implicate neurophysiological dysfunction in certain criminal groups. Hare named these subjects as pure or primary psychopaths.

With reference to previous research which has examined the association fo electrodermal skin conductance and sociopathy (Gruzelier & Venables, 1975; Hare, 1978), the present study does not support the theory that sociopathic subjects have lowere tonic or resting SC levels. Nor is the theory that SC leverls in sociopaths deline faster than those of normal subjects in boring experimental conditions. Significant to note, however, is that the present study does not include any comparison with normal subjects, as all subjects were inmates in a maximum security prison. Although no significant data is presented, a limited number of experimental subjects were observed by the experimenter to become unusually drowsy in the experimental condtion. A trend was also noted, in that subjects in Group II(AntiS) tended to hyporeact to stress with respect to electrodermal activity. These subjects were those who seemed not to demonstrate any other

indicators of physiological dysfunction, but who were noted to be the group who committed bank robberies, or who may be described as cool or hardened criminals.

With respect to Hare's work (1978) where the So scale distinguished between sociopathic groups. in the present study, the So scale roughly corresponded to the distinctions made on behavioral criteria. The conlusions of this study are that while the So scale is impressive in that it is demonstrated that a pencil and paper questionnaire can associate with deviancy, actual behavioral criteria appears to be a more certain indicator of criminal differences.

With respect to electrodermal arousal in excitatory conditions, as discussed by Lippert and Senter (1966) and Mawson and Mawson (1977), the present experiment demonstratees no significant differences between groups. The subjects in Group III(AntiS) did demonstrate a significant effect in their ability to recover from simulated stress more rapidly than the other experimental groups. This recovery can re related to the theories of the social learning psychologists who present this lack of continuing fear or arousal as a deterrent to social conditioning or learning.

In conclusion, this study addressed three basic research questions. Experiment One examined the effectiveness of an EMG biofeedback assisted relaxation program among inmate subjects in a maximum security prison. Such training was shown to be effective in a physiological as well as a psychological sense. No long-term follow-up measures were applied.

Experiment Two examined the association between the control of muscle tension and changes in autonomic scale of the CPI and electrodermal reactivity. While no such correlations were demonstrated, the results of this experiment led to the most interesting conclusions of the study, as inmate subjects who were distinguished on the basis of quantitative differences, that is, frequency of antisocial behaviors, were seen to demonstrate qualitative differences in behavior, in socioeconomic background, and in neurophysiological responsivity. Implications for further research are inherent in these findings, in further exploration of these differences, and in recognition of their possible significance in the treatment and rehabilitation of the perpetrators of serious crime.

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APPENDIX A

4.2 GENERAL ADMINISTRATIVE GUIDELINES FOR INSTITUTIONAL PLACEMENT

The classification and placement process involves completing the Penitentiary Placement Report which, following application of Benchmark criteria and the corresponding Guidelines for Benchmark Interpretation, determines the initial security needs of the incoming prisoner. However, a number of cases will be subject to "unusual" circumstances that potentially may adversely affect an inmate's identified security requirements.

The purpose of the general guidelines is to address major administrative factors which, if applicable, must be considered at the time of an inmate's initial placement. These guidelines should be applied only after the inmate has been classified in accordance with the Benchmark criteria and the corresponding guidelines. The prior completion of this step is mandatory in order to establish an inmate's security requirements which would be normally in effect had the "unusual" circumstances not applied.

The general basis for the establishment of "General Administrative Guidelines for Institutional Placement" is to ensure both consistency in the classification process and placement of inmates in institutions providing an appropriate security level for which the inmate qualifies. These guidelines will apply to all inmates who, at the time of initial placement, are subject to one or more of the following categories:

(a) Outstanding Charges, (b) Crown Appeal, (c) Deportation, (d) Protective Custody requirements, (e) Adequate information not available at the time of initial classification and placement.

In all instances, the following process should be followed:

STEP 1 - Complete the Penitentiary Placement Report.
STEP 2 - Apply Benchmark criteria.
STEP 3 - Apply "Guidelines for Benchmark Interpretation".
STEP 4 - Determine and identify an inmate's security classification.
STEP 5 - If applicable, refer to "General Administrative Guidelines for Institutional Placement" purposes.
STEP 6 - If application of STEP 5 changes an inmate's security classification (identified in STEP 4) and therefore will affect his initial placement, briefly explain this situation in Section VI of the Penitentiary Placement Report.
STEP 7 - If application of STEP 5 results in the inmate's initial placement at an institution of a higher security rating than would have been normally required, then it will be the responsibility of institutional staff (CMOI, LU, LUDO) to review the inmate's security rating within 6 weeks from the date of conclusive resolution of the applicable "Administrative Factor(s)", for the purpose of determining the inmate's suitability/eligibility for transfer to an institution reflective of the originally identified security requirements.

CATEGORY "A" - OUTSTANDING CHARGES

In the event that an inmate is facing outstanding criminal charges (see P.P.R., Section II) which, at the time of Initial Classification and Penitentiary Placement process, have not been dealt with by the courts, this factor must be seriously considered at the time of initial placement. The actual placement of an inmate will then be governed by the following factors: (1) the originally determined security requirements (see P.P.R., Section VI); (2) seriousness of the charges (see Offence Severity Scale), and their variance from present charges/convictions; (3) if convicted, potential effect on the length of aggregate sentence; (4) potential effect on the present rating of an inmate's escape risk; and (5) potential effect on the present rating of an inmate's propensity for violence.

Typically, an inmate who is facing an OUTSTANDING CHARGE(s) should not be initially placed at an institution below the S-4 level. Initial Placement at the S-3 level may only be considered if the following criteria apply:

(a) the inmate if facing a minor charge (see Offence Severity Scale);

(b) application of Benchmark criteria and the corresponding Guidelines result in no higher than S-4 level classification;

(c) administrative considerations, i.e., location of the court and the proximity of closest institution, date of scheduled court appearance.

Category "B" - Crown Appeal

In the event that prior to or during the Initial Classification and Penitentiary Placement process, the Crown either has appealed or is in the process of appealing an inmate's sentence, this factor must be considered when the inmate's institutional placement is being determined.

The actual placement of an inmate will then be governed by the following factors: (1) the originally determined security requirements (see P.P.R. Section VI); (2) potentially higher escape/security risk.

Typically, an inmate whose sentence has been appealed by the Crown, should not be placed initially at an institution below the S-5 level.

Category "C" - Potential Deportation Case

In the event that during the Initial Inmate Classification and Penitentiary Placement process, an inmate is either subject to an outstanding Order of Deportation or the Department of Manpower and Immigration is planning a review of his status, this factor must be considered when the inmate's institutional placement is being determined.

The inmate who is subject to potential deportation shall be placed at the S-4 level or above. The actual security requirements will be determined on the basis of the following criterian: (1) the originally determined security requirements, (see P.P.R., Section VI); (2) existence of outstanding charge(s) in a foreign country to which subject may be returned; (3) subject is under sentence and therefore is facing a term or imprisonment in a foreign country; (4) potential effect of (2) and/or (3) on the inmate's security/escape rating.

Category "D" - Potential Protective Custody Inmate

In the event that during the Initial Inmate Classification and Penitentiary Placement process, an inmate has been diagnosed to require Protective Custody, this factor will determine his actual institutional placement. All efforts should be made to either place such an inmate directly at an institution with the appropriate facilities or, if not possible, to place the inmate temporarily at the most appropriate institution where final arrangements for such a transfer will be completed. The actual institutional placement is subject to the inmate's security classification on the basis of the Benchmark criteria and the corresponding guidelines.

Category "E" - Unavailability of Adequate Information

In the event that during the Initial Inmate Classification and Penitentiary Placement process, the type and range of available information is inadequate to realistically evaluate the major security factors involved in a case, extreme caution should be exercised in determining institutional placement. An inmate who is affected by these circumstances cannot be initially placed at an institution below the S-4 level.

Following such a placement it is the responsibility of the classifying officer to obtain all the necessary documentation as expeditiously as possible and to complete the classification/placement process.

Benchmark Criteria For SHU

SHU Classification (and placement) of any inmate at this level is subject to the rules, regulations and criteria identified in CD's 174 and 718.

BENCHMARK CRITERIA FOR THE S-6 LEVEL

600 **The High Escape Risk**

1) The inmate with any record of escape(s) and/or attempt(s) to escape from an enclosed institution and who would be dangerous to the public if at large, or;

2) The inmate with a recent record (within the last 3 years) of escape(s) and/or attempt(s) to escape from an enclosed institution at the S-4 level and higher.

601 **The Hostage-Taker**

1) The inmate who has previously participated in a hostage-taking incident in or out of prison, (this includes kidnapping, hijacking, abduction), or;

2) The inmate who has made active threats and is therefore considered a potential hostage-taker.

602 **The Aggressive and Dangerously Violent Inmate**

1) The inmate who has a history of aggressive behaviour, i.e.: has willfully inflicted or attempted to inflict serious bodily injury to others in or out of prison, and/or;

2) The maladjusted individual who appears to suffer from a deeply-rooted personality disorder resulting in violent behaviour, and/or;

3) The inmate who displays an aggressively uncooperative attitude toward institutional program(s) and staff and presents a potentially serious management problem within an institution.

603 The inmate convicted of a major offence. (See Offence Severity Scale).

604 **The Riotous Inmate**

The inmate who has previously participated either as a leader or instigator of one or more prison riots or disturbances.

605 The inmate who has participated in highly coordinated criminal activities of a serious nature involving two or more individuals.
(Example: racketeering, conspiracy to traffic in dangerous drugs, counterfeiting).

606 The inmate sentenced to a long prison term (10 years or over).

607 The inmate sentenced to a period of Preventive Detention under the Criminal Code of Canada.

Benchmark Criteria for the S-5 Level

500 The inmate who has a past record (more than 3 years old) for escape(s) and/or attempted escape(s) from enclosed institutions at the S-4 level or lower, and who is considered potentially dangerous if at large.

501 The inmate with no escape record but who may constitute an immediate escape risk and, based on his record of violence, is potentially dangerous if at large.

502 The inmate who does not indicate an interest in institutional programs, but who will probably comply with institutional program requirements when required.

503 The inmate who has a record of moderately violent behaviour and has demonstrated a tendency to be antagonistic or abusive to other inmates and/or staff.

504 **The Structured Criminal**

1) The inmate whose values are deeply rooted in criminal activities and for whom crime has become an integral part of his life-style, and/or;

2) The inmate who has served two or more federal terms for moderate and/or serious offences. (See Offence Severity Scale.)

505 **The Notorious Offender**

The inmate who has received unusual and extensive publicity and whose presence in a lesser security environment would tend to depreciate the seriousness of the crime.

NOTE: Extensive publicity could be due to the seriousness of the criminal act, nature of the
NOTE:

506 The inmate convicted of a serious offence. (See Offence Severity Scale).

BENCHMARK CRITERIA FOR THE S-4 LEVEL

400 The inmate with a record of escape(s) and/or attempted escape(s) from an institution(s) below the S-4 level (inclusive of ESCAPE LAWFUL CUSTODY, UAL, and ESCAPE FROM PROVINCIAL INSTITUTIONS) who is not considered dangerous but who could cause some minor incident(s) if at large. This inmate is unlikely to make active efforts to escape but may do so if the opportunity presents itself.

401 The inmate who displays a cooperative attitude toward institutional programs.

402 The inmate who possesses some violent tendencies but does not normally pose a threat to other inmates and/or staff.

403 **The Young Offender**

The inmate 23 years of age or under with some history of disruptive behaviour in or out of an institution.

404 The inmate serving a sentence of 5 to 10 years.

405 The first-time federal inmate convicted of a moderate or serious offence. (See Offence Severity Scale).

406 The non-violent federal recidivist who can easily adapt to institutional rules and regulations.

BENCHMARK CRITERIA FOR THE S-3 LEVEL

300 The inmate who is considered unlikely to escape from an enclosed institution, but is a definite risk in an institution which has no enclosure.

301 The inmate with no history of violent behaviour.

302 The positively motivated inmate who has indicated a definite interest in institutional programs.

303 The recidivist with an established history of involvement in moderate and/or minor criminal activities. (See Offence Severity Scale).

304 The inmate serving a prison term of up to 5 years.

BENCHMARK CRITERIA FOR THE S-2 LEVEL

200 The inmate who may be a slight walkaway risk but is not considered violent or dangerous if at large. This type of inmate would pose only a minimum risk for causing incidents if at large.

201 The first-time federal inmate who has a definite history of involvement in minor crimes only. (See Offence Severity Scale).

202 The inmate who is positively motivated to work. Normally, this type of inmate would have experienced some periods of work stability in the past.

203 The inmate requiring little supervision and who is capable and willing to work in a labour-oriented environment.

BENCHMARK CRITERIA FOR THE S-1 LEVEL

100 The non-violent inmate who is not a walkaway risk. No risk of incidents if at large.

101 The inmate who is incarcerated for a first federal term and who is convicted of a Minor crime. (See Offence Severity Scale).

102 The positively motivated inmate who demonstrates a readiness and desire to successfully reintegrate into society.

103 The inmate who is capable of functioning in the community with minimum supervision.

GUIDELINES FOR INTERPRETATION OF BENCHMARKS

GUIDELINE FOR S-6 LEVEL CLASSIFICATION

S-6 level classification is mandatory for an inmate if any one or more of the following benchmarks apply: 600, 601, 602, 604 or 607.

NOTE: S-5 level classification may be considered for an inmate who qualifies under benchmarks 603, 605 and/or 606 but does not qualify under any one or more of the benchmarks identified for mandatory S-6 level classification.

GUIDELINE FOR S-5 LEVEL CLASSIFICATION

S-5 level classification is mandatory for an inmate if any one or more of the following benchmarks apply: 500, 501 or 503.

NOTE: S-4 level classification may be considered for an inmate who qualifies under benchmarks 502, 504, 505, and/or 506 but does not qualify under any one or more of the following criteria: 500, 501, 503, or any S-6 level benchmark.

GUIDELINE FOR S-4 LEVEL CLASSIFICATION

S-4 level classification is mandatory for an inmate if any one or more of the following benchmarks apply: 400 or 402.

NOTE: S-3 level classification may be considered for an inmate who qualifies under benchmarks 401, 403, 404, 405, and/or 406, but does not qualify under any other higher level benchmark.

GUIDELINE FOR S-3 LEVEL CLASSIFICATION

S-3 level classification should only be designated if benchmarks 300 (or 200) and 302 (or 202) apply and other applicable benchmarks do not include the following criteria: 400, 402 or any S-5 and/or S-6 level benchmarks.

NOTE: S-2 level classification should only be considered for an inmate who qualifies under benchmarks 301 and/or 304 but does not qualify under any other higher level benchmark.

GUIDELINE FOR S-2 LEVEL CLASSIFICATION

S-2 level classification should only be considered for an inmate who qualifies under all of the following benchmarks: 200, 202, 203, 301 and 304. (Note: an inmate does not need to qualify under benchmark 201).

GUIDELINE FOR S-1 LEVEL CLASSIFICATION

NOTE: Placement of an inmate at the S-1 level is not permissible during the Initial Inmate Classification and Penitentiary Placement process. Placement of inmates at this level is governed by the National Parole Board's rules, regulations and criteria.

OFFENCE SEVERITY SCALE

Major Offences

1. First, Second-degree Murder and Attempted Murder.
2. Assault causing or intended to cause serious injury, disfigurement, or mutilation.
3. Kidnapping, forcible detention/abduction, and/or hostage-taking.
4. Hijacking of aircraft and/or piracy of sea vessels.
5. Treason.
6. Espionage.
7. Illegal possession and/or detonation of explosives which are likely to cause death.
8. Violent terrorist activities.

Serious Offences

1. Robbery with violence.
2. Violent sex offences (i.e., rape, attempted rape, child molestations, etc.).
3. Arson.
4. Sabotage.
5. Conspiracy to traffic or import a dangerous drug.
6. Trafficking and possession for the purpose of trafficking (dangerous drugs).
7. Trafficking in illegal firearms.
8. Manslaughter.
9. Extortion.
10. Armed Robbery or Attempted Armed Robbery.
11. Prison breach.
12. Escape custody with violence.

Moderate Offences

1. Possession of dangerous drugs.
2. Trafficking, conspiracy, possession for the purpose of trafficking (soft drugs).
3. Forgery.
4. Fraud.
5. Bribery.
6. Forcible entry.
7. Break and Enter/Breaking Out.
8. Criminal negligence causing death or resulting in bodily harm.
9. Non-violent sex offences (i.e., gross indecency, indecent assault, incest).
10. Robbery (excluding armed robbery and robbery with violence).
11. Escape (non-violent).
12. Theft over 200 dollars.
13. Obstruction of justice and perjury.
14. Possession of stolen property over 200 dollars.
15. Possession of a weapon for a purpose dangerous to the public peace.
16. Assault causing bodily harm.

Minor Offenses

1. Possession of stolen property under 200 dollars.
2. Common assault.
3. Possession of soft drugs.
4. Theft under 200 dollars.
5. Public mischief.
6. Criminal negligence not resulting in bodily harm.
7. Possession of a restricted or prohibited weapon.
8. Possession of forged currency, passports, cheques.
9. Unlawfully-at-Large.

APPENDIX B

INITIAL INTERVIEW

NAME:_____BIRTHDATE:_____

REASON FOR SEEKING TREATMENT_____

_____

_____

_____

PREVIOUS RELAXATION TRAINING_____

_____

MEDICAL HISTORY

Have you had any serious diseases like

heart trouble_____

respiratory illness_____

encephalitis, epilepsy_____

ulcer, ulcerative colitis, migraine (psychosomatic)_____

_____

other_____

nervous breakdown_____

serious injury or accident_____

SYMPTOMS

Do you experience any of the following (annoying or disabling)

headache_____

blurred vision_____

dizzy spells_____

palpitation_____

chest pain_____

anxiety attacks_____

nervousness_____

weak feelings (fatigue)_____

abdominal pain_____

back pain_____

lump in throat_____

lability (cry easily, easily depressed)_____

Have you ever felt like you wanted to die?_____

Have you ever felt like commiting suicide?_____

ever tried?_____

how many times?_____

insomnia_____

outbursts of rage with little provocation_____

murderous feelings (like you wanted to kill someone)_____

fears (heights, dark, paranoia)_____

MEDICATIONS (current)

_____

_____

_____

_____

COMMENTS/QUESTIONS_____

_____

_____

_____

APPENDIX C

RELEASE FORM

I, _____, AGREE TO PERMIT THE RELEASE OF PHYSIOLOGICAL DATA COLLECTED DURING THE BIOFEEDBACK TRAINING SESSIONS IN WHICH I AM PARTICIPATING. I UNDERSTAND THAT THIS DATA ALONG WITH CERTAIN COMPLETED QUESTIONNAIRES WILL BE USED ANONYMOUSLY AND THAT MY NAME WILL NOT BE USED IN ANY WAY.

I UNDERSTAND THAT NO INFORMATION COLLECTED IN THIS RESEARCH PROJECT WILL BE RELEASED TO ANY AUTHORITY WHATSOEVER, BUT WILL BE UTILIZED ANONYMOUSLY FOR RESEARCH PURPOSES ONLY.

SIGNED:_____

WITNESS:_____

DATED THIS_____DAY OF_____, 19____.

APPENDIX D

INTERVIEW/HISTORY

DEMOGRAPHICS

1. Name:_____ 2. Birthdate:_____

3. Have you ever used any other name other than the name we have?_____

CHILDHOOD

4. Where were you born?_____

5. Did you live at home as a child?_____

   For how long?_____

6. Did you have brothers and sisters?_____

7. Did you grow up in the country, small town, city, where?_____

8. Did you move many times?_____

9. Tell me something about your home life? Was your home life satisfactory or could it have been a whole lot better?_____

   _____

10. Did your parents work?_____

11. Was there much quarreling and fighting in your family?

    _____ If yes, most of the time?_____

12. Have your parents separated or divorced?_____

13. Did either of your parents (guardians) drink too much while you were still at home?_____

14. Did you suffer in any way because of this?_____

    _____

15. Did they need financial help from any agency or anyone to keep the family going?_____

16. Do you think your parents (guardians) took good care of you?_____

Were they too strict or not strict enough?_____

SCHOOL

17. How far did you go in school?_____

18. How many different schools did you attend?_____

19. How was your school record, your grades?_____

20. Did you ever fail a grade?_____

21. Did you have any trouble with your teachers?_____

_____

22. Did you have many fights with other students? Did you start fights?_____

23. Were you ever asked to leave school (expelled or suspended?_____

JOBS

24. What did you do after you left school?_____

_____

25. Have you worked?_____

26. When was the last time you worked (if answered yes to the above)_____

27. What kinds of work have you done?_____

_____

28. How many jobs have you had?_____

29. Have you ever been fired from a job? Reason?_____

_____

30. Did you quit some of the time? Why?_____

_____

FAMILY

31. Have you ever been married?_____

32. If so, what is your marriage history?_____

_____

33. Have you any children?_____How many_____

Who cares for them?_____

34. If yes, do you see your children now?_____

35. Have any of your children given you any trouble?

(school, running away, arrests)_____

_____

36. Are your parents still living?_____

37. Do you see them? Telephone them? Write them?_____

38. Do you have any living brothers and sisters?_____

If so, where do they live and what do they do?_____

_____

39. Are there any members of your family you don't care to associate with ?_____

40. Are there any members of your family who don't care to associate with you?_____

41. Were you brought up to go to church?_____

If so, do you still go?_____

TROUBLES

42. Children often get in trouble with the police. Did you ever have any trouble like this? Thefts? Vandalism?

How old?_____

43. Did you ever belong to any gang of children?_____

44. Did you play hooky from school a lot?_____

45. When was the first time you were arrested?_____

46. What were you charged with?_____

47. Did you go to court?_____

48. Were you convicted?_____

49. How long did you serve?_____Where?_____

50. When was the next time you were arrested?_____

_____

51. How many arests have you had altogether?_____

52. How much time have you served altogether?_____

53. Has being in jail helped you in any way?_____

_____

54. Has it hurt you in any way?_____

_____

CHANGES

55. When you were a youngster, were you considered either an unusually good or an unusually bad child or neither?

_____

56. By the time you were in your late teens, say 18 or 19, would you say that you were:

a) rather serious minded or rather carefree or neither?

_____

b) rather sociable, wanting to be with people or the kind who kept to himself or neither?_____

c) always out, never at home, or did you stay around home a lot, or neither?_____

d) conservative, practical, conventional ordering, looking for something new and exciting, or neither?____

_____

57. Are you still: (cover choices above, for "neithers", have you become "either")

serious_____	carefree_____
social_____	keeps to self_____
out, going places_____	homebody_____
conservative_____	daring_____

58. When you were 18 or 19, did you like to drive fast? (or ride in cars that were driven fast?)_____

How do you feel about it now?_____

59. When you were 18 or 19, did you get into fights and arguments?_____

60. Did you spend money carelessly or extravagantly, when young?_____

61. (If changes are reported in answer to questions 56 to 60) You've mentioned several ways in which you have changed since you were young. About what age do you think you started to change?_____

_____

62. (If settled down) Do you have any ideas about why you began to settle down then?_____

_____

ALCOHOL/DRUGS

63. Did you do any drinking when you were young?_____

If yes, how often?_____

Do you drink now?_____

64. If you drank when you were young, or if you drink now, do you think that you drank too much?_____

65. Were there complaints at home about your drinking?_____

_____

66. Has your drinking caused you trouble (arrests, DT's, hallucinations)?_____

67. Do you take drugs for sleeping? for medicine? other?

_____

68. What do you take?_____

69. Have you experimented with other drugs?_____

70. Do you think that you take drugs too much?_____

71. Did it cause symptoms when you stopped?_____

72. Have you had arrests because of drugs?_____

73. That's all I want to ask you. Is there anything you'd like to add or are there any questions that you object to?_____

APPENDIX E

SOCIALIZATION SCALE CALIFORNIA PERSONALITY INVENTORY

NAME_____ DATE_____

		TRUE	FALSE
1.	I often feel that I made a wrong choice in my occupation.	____	____
2.	When I was going to school I played hooky quite often.	____	____
3.	I think Lincoln was greater than Washington.	____	____
4.	I would do almost anything on a dare.	____	____
5.	With things going as they are, it's pretty hard to keep up hope of amounting to something.	____	____
6.	I think I am stricter about right and wrong than most people.	____	____
7.	I am somewhat afraid of the dark.	____	____
8.	I hardly ever get excited or thrilled.	____	____
9.	My parents have often disapproved of my friends.	____	____
10.	My home life was always happy.	____	____
11.	I often act on the spur of the moment without stopping to think.	____	____
12.	My parents have generally let me make my own decisions.	____	____
13.	I would rather go without something than ask for a favor.	____	____
14.	I have had more than my share of things to worry about.	____	____
15.	When I meet a stranger I often think that he is better than I am.	____	____

16. Before I do something I try to consider how my friends will react to it. ____ ____

17. I have never been in trouble with the law. ____ ____

18. In school I was sometimes sent to the principle for cutting up. ____ ____

19. I keep out of trouble at all costs. ____ ____

20. Most of the time I feel happy. ____ ____

21. I often feel as though I have done something wrong or wicked. ____ ____

22. It is hard for me to act natural when I am with new people. ____ ____

23. I have often gone against my parents' wishes. ____ ____

24. I often think about how I look and what impression I am making upon others. ____ ____

25. I have never done any heavy drinking. ____ ____

26. I find it easy to "drop" or "break" with a friend. ____ ____

27. I get nervous when I have to ask someone for a job. ____ ____

28. Sometimes I used to feel that I would like to leave home. ____ ____

29. I never worry about my looks. ____ ____

30. I have been in trouble one or more times because of my sex behavior. ____ ____

31. I go out of my way to meet trouble rather than try to escape it. ____ ____

32. My home life was always very pleasant. ____ ____

33. I seem to do things that I regret more often than other people do. ____ ____

34. My table manners are not quite as good at home as when I am out in company. ___ ___

35. It is pretty easy for people to win arguments with me. ___ ___

36. I know who is responsible for most of my troubles. ___ ___

37. I get pretty discouraged with the law when a smart lawyer gets a criminal free. ___ ___

38. I have used alcohol excessively. ___ ___

39. Even when I have gotten into trouble I was usually trying to do the right thing. ___ ___

40. It is very important to me to have enough friends and social life. ___ ___

41. I sometimes wanted to run away from home. ___ ___

42. Life usually hands me a pretty raw deal. ___ ___

43. People often talk about me behind my back. ___ ___

44. I would never play cards (poker) with a stranger. ___ ___

45. I don't think I'm quite as happy as others seem to be. ___ ___

46. I used to steal sometimes when I was a youngster. ___ ___

47. My home as a child was less peaceful and quiet than those of most other people. ___ ___

48. Even the idea of giving a talk in public makes me afraid. ___ ___

49.	As a youngster in school I used to give the teachers lots of trouble.	____	____
50.	If the pay was right I would like to travel with a circus or carnival.	____	____
51.	I never cared much for school.	____	____
52.	The members of my family were always very close to each other.	____	____
53.	My parents never really understood me.	____	____
54.	A person is better off if he doesn't trust anyone.	____	____

APPENDIX F

Psychophysiological Profile Procedure

1. Seat subject in recliner chair and tilt chair to the first recliner position.

2. Hook-Up EDR - dominant hand; EMG - frontal area with electrodes spaced at 1 inch.

3. Explanation "Today's session will last approximately 45 minutes. What I am going to do is attach you to two biofeedback instruments in order to see what levels of activity you produce in two different physiological systems: (1) muscle tension, and (2) skin perspiration (indicate corresponding instruments). These instruments will not shock you or harm you in any way, they merely attach onto the surface of your skin with these wires. We are hooking you up today in order to measure your body activity and your present ability to relax, also that we may determine how the relaxation treatment program will change both your body activity and your ability to achieve relaxation. Do you have any questions?"

4. Relaxation instructions to be read to the subject. "For the next 5 minutes I would like you to relax comfortably with your eyes open and just listen to the music being played in the background. Try to avoid unpleasant thoughts and just enjoy this 5 minutes of rest. After 5 minutes have elapsed I will ask you to sit for 15 minutes with your eyes closed. Please sit quietly without moving or talking and keep your hands on the arm rest with your palms facing upward. Do you have any questions? Okay then, starting with your eyes open just relax and I will tell you when 5 minutes are up.

5. Turn on EMG, EDR, 2 Optical Isolators, Computer and Printer.

6. Settings EMG scale X1; EDR scale X1.

7. Identify subject on ticker tape.
   Example: Name:
   Date:
   Therapist's Initials:

During session draw lines to divide "A" - 5 minutes adaptation; "B" - 15 minutes relaxation; "C" - 3 minutes stress; "D" - 5 minutes recovery (X3). Label periods between lines on the ticker tape.

8. Turn on Music low volume.

9. Start Timer and Computer - conduct 5 minute adaptation.

   Reset timer for 15 minutes.

10. Relaxation period say to subject: "And now I would like to sit for 15 minutes with your eyes closed. Try not to fall asleep".

    After 15 minutes draw a line on the printout and mark "C" in the next section.

    Reset timer for 3 minutes.

11. Stress period say to the subject: "Okay while keeping your eyes closed now I want you to perform a mental task for me. I want you to subract 7 from 1,000 and then to continue subtracting 7 from your answer as fast as possible until I tell you to stop. I would like you to do this out loud for a period of three minutes. Are you ready?

    Draw a line on the printout and mark "D" in the next section.

    Reset timer for 5 minutes.

12. Recovery Period Say to subject: "Now I just want you to relax again with your eyes closed and listen to the music without interruption for 5 minutes and then we are finished.

    After 5 minutes end session and disconnect subject.

APPENDIX G

E.M.G. TRAINING PROCEDURES AND INSTRUCTIONS

1. Check tape in printer.

2. Mark treatment session number in progress in file and on printout.

3. (a) Attach EMG electrodes. Make sure impedence levels read less than 1 for each electrode with scale setting at X3. If not, re-do cleansing of forehead with alcohol.
   (b) Attach EDR electrodes to the palmar surfaces of the third and fourth finger of the dominant hand.

4. Check if subject has read the rationale, if not read it together.

5. Settings Leave EMG at X1 setting. Explain EMG gauge setting and units of measurement to subjects. Occlude all gauges from subject view and disengage auditory feedback.

6. Turn on: EMG, optical isolators, computer and printer. Turn fluorescent lights off.

7. Identify subject on ticker tape.

   Example: Name:
   Date:
   Session:

8. Give the following instructions: "This session will last approximately 30 minutes. Please keep your eyes open during the entire session. The session will consist of two phases. You will not receive any biofeedback during the first phase which is an adaptation phase."

9. Start timer and computer simultaneously.

10. Give the following instructions: "For the next 2 minutes I would like you to decrease your muscle tension without feedback."

11. After 2 minutes draw a line on the printout and say "This is the training phase. You will have three periods of 5 minutes of practice and 1 minute of rest. Uncover the EMG gauge. Have subject put on headphones and turn up the volume to the preferred setting. Say: "As you decrease the muscle tension in your head region the clicks will slow down. For the next 5 minutes I would like you to practice decreasing your muscle tension."

12. Draw a line on the printout and begin timer.

13. After 5 minutes draw a line on the printout and say "Please stop practicing now and just take a break." Discuss performance. After 1 minute draw a line on the printout and say: "Now please begin practicing again for 5 minutes." Follow with 1 minute of rest."

14. Follow with 5 more minutes of practice.

15. Discuss progress during session. At the end of each training session show each subject the EMG levels they achieved and compare these to the two minute EMG average value computed at the end of minutes of relaxation during the pretreatment monitoring session. Point out that ideally they will be learning to become more relaxed, faster, and be able to maintain such relaxed levels longer.

APPENDIX H

E.M.G. Rationale

The six treatment sessions you are receiving are designed to teach you how to produce more effective physiological relaxation at will. Your final goal in treatment is to become able to discriminate excessive stress in your body and be able to remove such stress in order to experience greater physical comfort. Regular and consistent practice at removing excessive stress will eventually develop into a life-style habit. When this occurs your body will maintain a more relaxed level of arousal without conscious effort. It may take somewhere between a couple of weeks to several months to develop this automatic habit, depending upon the amount of relaxation practice you do and the strength of the stress habit you now have.

In biofeedback training you will learn to relax efficiently, guided by the feedback signal. The idea is to slow down the clicking noise which indicates the level of muscle tension in your head region. Slower clicking means less tension. Over time you will learn to produce lower levels of tension in less time and to maintain these low levels for longer periods. Even though the biofeedback is only attached to the head region it is to your advantage to learn to relax throughout your entire body.

Biofeedback guided relaxation takes place in 3 stages. The first stage is called the "awareness" stage where your brain is merely made aware of how much clicking feedback corresponds to how much muscle tension. Gradually the second stage emerges where in addition to becoming aware of tension levels you become able to control the tension and further reduce it. This second stage is known as the "control" stage.

Please note that the control stage takes time to emerge because you must learn the skill involved. Also note that contrary to most other intentional learning you do, learning to relax does not involve active striving. The more you strive the more tense you will become. Instead of actively striving to reduce muscle tension you must passively concentrate on the feedback signal and "allow" the clicking to reduce. In other words, "let it happen."

The final stage of biofeedback guided relaxation, following awareness and control is the "weaning" stage. Weaning involves practice at producing the relaxation response in the absence of the biofeedback signal (clicks). Such practice will be provided in the final session. In

this way you can learn an effective relaxation skill which is not dependent upon biofeedback.

Many persons have asked what thinking strategies they would be using to slow the clicking as they passively concentrate. Other than advising such persons to avoid unpleasant thoughts or stress-related ruminations. There is no particular strategy that everyone will find effective. Some people use mental images of relaxing settings such as laying on a warm beach, skiing down a mountain in slow motion, or watching a beautiful sunset. Others think suggestive phrases to themselves such as "I am becoming more relaxed, more calm and more quiet, I am becoming warm and relaxed." Others do not think about anything, they let their minds go blank. Most people find some particular strategy useful at first but as they learn to relax efficiently, letting go of tension becomes a skill they can utilize without any conscious strategy. Over the course of the 6 training sessions, I would like you to use whatever strategies you feel comfortable with to relax. But remember, the important thing is not to force any approach or to try too hard, because effort is the opposite of relaxation. Just let the approach you choose flow, just imagine it is already happening.

APPENDIX I

SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

STAI FORM X-1

NAME _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I am regretful	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel rested	①	②	③	④
9. I feel anxious	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel "high strung"	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel over-excited and "rattled"	①	②	③	④
19. I feel joyful	①	②	③	④
20. I feel pleasant	①	②	③	④

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APPENDIX J

SUMMARIES OF ANALYSES OF VARIANCE

Summary of Analysis of Variance for EMG Relaxation Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 36).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	563.9	35			
A	5.07	1	5.07	0.31	0.58
SUBJECTS WTHN GROUP	558.9	34	16.44		
WTHN SUBJECTS	333.9	36			
B	22.09	1	22.09	2.45	0.13
AB	4.76	1	4.76	0.53	0.47
B X SUBJ WTHN GROUP	307.0	34	9.03		

Summary of Analysis of Variance for EMG Stress Variable, Mean Scores. Experimental and Control Groups, Two Factor Repeated Measures, (N = 36).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	4518.00	35			
A	0.11	1	0.11	0.001	0.98
SUBJECTS WTHN GROUP	4518.00	34	132.87		
WITHIN SUBJECTS	1433.00	36			
B	30.42	1	30.42	0.74	0.40
AB	1.81	1	1.81	0.04	0.84
B X SUBJ WTHN GROUP	1401.00	34	41.20		

Summary of Analysis of Variance for EMG Recovery Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 36).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	136.3	35			
A	3.58	1	3.58	0.92	0.35
SUBJECTS WTHN GROUP	132.8	34	3.91		
WITHIN SUBJECTS	63.71	36			
B	5.77	1	0.06	0.03	0.86
AB	6.21	1	6.21	3.67	0.06
B X SUBJ WTHN GROUP	57.45	34	1.69		

Summary of Analysis of Variance for EMG Relaxation Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	31.06	27			
A	0.49	1	0.49	0.42	0.52
SUBJECTS WTHN GROUP	30.56	26	1.18		
WITHIN SUBJECTS	36.25	28			
B	7.37	1	7.37	7.02	0.01
AB	2.13	1	2.13	2.03	0.17
B X SUBJ WTHN GROUP	27.27	26	1.05		

Summary of Analysis of Variance for EMG Recovery Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	31.63	27			
A	0.56	1	0.56	0.47	0.50
SUBJECTS WTHN GROUP	31.07	26	1.19		
WITHIN SUBJECTS	36.81	28			
B	7.53	1	7.53	7.09	0.01
AB	2.18	1	2.18	2.05	0.16
B X SUBJ WTHN GROUP	27.63	26	1.06		

Summary of Analysis of Variance for EMG Treatment Variable, Mean Scores, Experimental Group, One Factor Repeated Measures, (N=13).

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN PEOPLE	24.81	12	2.07	
WITHIN PEOPLE	102.83	65	1.58	
REPEATED MEASURES	22.71	5	4.54	3.40
RESIDUAL	80.12	60	1.33	
TOTAL	127.64	77		

PROBABILITY OF F = 0.009 DF = (5,60)

Summary of Analysis of Variance for EMG Treatment Variable, Mean Scores, Experimental Group, Single Factor Repeated Measures, (N=15).

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN PEOPLE	34.77	14	2.48	
WITHIN PEOPLE	49.50	75	0.66	
REPEATED MEASURES	5.28	5	1.06	1.67
RESIDUAL	44.22	70	0.63	
TOTAL	84.27	89		

PROBABILITY OF F = 0.153 DF = (5,70)

Summary of Analysis of Variance for EMG Treatment Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	59.63	27			
A	4.87	1	0.05	0.02	0.89
SUBJECTS WTHN GROUP	59.58	26	2.29		
WITHIN SUBJECTS	152.3	140			
B	22.06	5	4.41	4.61	0.001
AB	7.17	5	1.43	1.50	0.195
B X SUBJ WTHN GROUP	124.3	130	0.96		

Summary of Analysis of Variance for A-State Variable, Two Factor Repeated Measures, (N=35)

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	3817.00	34			
A	46.45	1	46.45	0.41	0.53
SUBJECTS WTHN GROUP	3770.00	33	114.24		
WITHIN SUBJECTS	2187.00	35			
B	1227.00	1	1226.66	42.18	0.00
AB	0.41	1	0.41	0.01	0.91
B X SUBJ WTHN GROUP	959.7	33	29.08		

Summary of Analysis of Variance for EDR Relaxation Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	611.4	27			
A	40.92	1	40.92	1.87	0.18
SUBJECTS WTHN GROUP	570.5	26	21.94		
WITHIN SUBJECTS	316.4	28			
B	1.76	1	1.76	0.19	0.67
AB	68.91	1	68.91	7.26	0.012
B X SUBJ WTHN GROUP	246.9	26	9.50		

Summary of Analysis of Variance for EDR Stress Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	2415.00	27			
A	102.3	1	102.34	1.15	0.29
SUBJECTS WHTN GROUP	2313.00	26	88.95		
WITHIN SUBJECTS	374.2	28			
B	2.16	1	2.16	0.19	0.67
AB	77.51	1	77.51	6.81	0.015
B X SUBJ WTHN GROUP	295.9	26	11.38		

Summary of Analysis of Variance for EDR Recovery Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	1186.00	27			
A	97.00	1	97.00	2.32	0.14
SUBJECTS WHTN GROUP	1089.00	26	41.90		
WITHIN SUBJECTS	329.8	28			
B	0.33	1	0.33	0.04	0.85
AB	83.94	1	83.94	8.88	0.006
B X SUBJ WTHN GROUP	245.8	26	9.46		

Summary of Analysis of Variance for EDR Treatment Variable, Mean Scores, Experimental Group, One Factor Repeated Measures, (N=13).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F
BETWEEN PEOPLE	3059.49	12	254.96	
WITHIN PEOPLE	1656.24	65	25.48	
REPEATED MEASURES	97.61	5	19.52	0.75
RESIDUAL	1558.63	60	25.98	
TOTAL	4715.73	77		

PROBABILITY OF F = 0.5888 DF = (5,60)

Summary of Analysis of Variance for EDR Treatment Variable, Mean Scores, Experimental Group, One Factor Repeated Measures, (N=13).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F
BETWEEN PEOPLE	1729.22	14	123.52	
WITHIN PEOPLE	2708.17	75	36.11	
REPEATED MEASURES	139.88	5	27.98	0.76
RESIDUAL	2568.29	70	36.69	
TOTAL	4437.39	89		

PROBABILITY OF F = 0.580 DF = (5,70)

Summary of Analysis of Variance for EDR Stress Variable, Mean Scores, Experimental and Control Groups, Two Factor Repeated Measures, (N = 28).

SOURCE	SUM OF SQUARES	D.F.	MEAN SQUARES	F	P
BETWEEN SUBJECTS	5032.00	27			
A	243.6	1	243.61	1.32	0.26
SUBJECTS WHTN GROUP	4789.0	26	184.18		
WITHIN SUBJECTS	4365.0	140			
B	144.6	5	28.93	0.91	0.48
AB	89.80	5	17.96	0.57	0.73
B X SUBJ WTHN GROUP	4127.00	130	31.75		